INDEX.

Illustrations.

LIST OF NAMES.

ABBOTT and Co., Messrs., Fifteen-ton Forge Crane, 178, 180
Abergeldie, Suspension Bridge at, Messrs. Blaikie Brothers, 102
Acme Coal Borer, The, Inventions Exhibition, 311
Albert Bridge, The, 429
Alexandria, Destruction of Guns at, by Gun-cotton, 247
Allen and Co., Messrs. W. H., Engine and Kapp Dynamo, Inventions Exhibition, 85
Allin, Mr. Sealey, Water Motor, Inventions Exhibition, 311
American Locomotive for New Zealand, Messrs. Burnham, Parry, and Williams, 422
Anders, Mr. David B., Improved Cable Gripper, 212
Anderson and Co., Messrs. G., Steam Derrick Crane, Inventions Exhibition, 349
Andrews, Messrs. J. F. D., Dynamos, Inventions Exhibition, Sketch Showing Mode of Connecting Opposite Coils, Fig. 3, p. 62
Anglo-American Brush Electric Light Corporation, Dynamos, Inventions Exhibition, 193
Antwerp, Electric Light Installation, 387
Antwerp Exhibition, Compound Engines at, La Société Cockerill, 211, 222, 242
Antwerp Exhibition, General Plan of, 119
Arbroath, Adit Well at, 296
Arrowsmith, Mr., Propeller Shaft, 51
Asquith, Mr. W., Radial Drilling and Boring Machine, 381
Atkinson, Mr. James, Gas Engines, Diagram Showing Ignition of a Full Charge, 57
Atkinson, Mr., Differential Gas Engine, Inventions Exhibition, 99
Atkinson's Gas Engine, The British Gas Engine Company, Inventions Exhibition, 480, 481
Automatic Vacuum Brake Company, The, Automatic Vacuum Brake, Inventions Exhibition, 298
Aveling and Porter, Messrs., Traction Engine Steering Gear, 503

BABCOCK and Wilcox Company, The, Development of a Water-tube Boiler, 322, 323
Bahamas, Watling Island, Lantern for Light Apparatus of the Second Order, 255
Baldwin Boiler, Testing, 214
Banting, Mr. W. L., Axle and Axle-box, Inventions Exhibition, 393
Beasley, Mr. A. H., Large Thick Slurry Pumps, 472
Belgian State Railways, Express Passenger Engines for Steep Gradients, 197, 204
Bennison, Mr., Engine, 487
Berry, Mr. Henry, Hydraulic Forging Press, 337
Berthon, Mr. E. S., Berthon Boats, 67
Beveridge, Mr. James, Valve Gear, 35
Birmingham, Eagle Foundry, Grasshopper Engine, 123
Blythswood Indicator, Sir A. C. Campbell, Inventions Exhibition, 400
Bollinckx, Mons., Condensing Engine, Antwerp Exhibition, 469, 476
Bracher, Mr., Peat Breaking Machine, Royal Agricultural Show, 55
Bray and Heald, Messrs., Patent Excentric, 360
Brasil, Steam Trawler for, Messrs. Cochran and Co., 382
Brehmer Bros., Messrs., Bevel Gear Cutting Machine, 35
Bristol Council Hall, Ventilator, 380
Britannia Company, The, General Purpose Lathe, 494
Britannia Company, The, Triangular Bevel Gauge, 494
Brown and Co., Messrs. John, Solid Forged Steel Wheels, Eyre's Patent, 448
Brown and Guinery, Messrs., Lock, 317, 334
Brown and Porter, Messrs., Chimney Climber, 131
Broxbourn Colliery, Hydraulic Pump, Mr. J. Moore, 265
Budapest National Exhibition, The, 196, 198

CADIZ Target, The, 247
Cameron's Mechanical Movement, 309
Camperdown, Belted, Showing Wave in Relation to Belt, 100
Carter, Mr. J. H., Disintegrator, Royal Agricultural Show, 56
Cawnpore Achnera Railway Iron Wagons, 86
Central India Railway, Smithy Roof, 274
Chambers, Mr. J., Air Cooler, 131
Chambers, Mr. J., Refrigerating Machine, 130
Clerk Gas Engine, The, Messrs. L. Sterne and Co., Inventions Exhibition, 257
Coles, Mr. H. J., Single Chain Grab Dredger, Inventions Exhibition, 310
Cummin's Cotton-Baling Press, exhibited by Messrs. Ormerod, Grierson, and Co., Inventions Exhibition, 64, 65
Cuthbert, Mr Ed., Combined Trap and Gulley, 400
Cavetkovic, M. D., Automatic Floodgate, 131

DANIELL Cell, Standard, 150
Danube Bridge Project, Culman's Graphic Treatment of Elastic Arches, Mr. R. H. Graham, 41, 42, 43
Davis and Primrose, Messrs. Arthur's Machine for Beveiling Angle Iron for Ships' Frames, 393
Deane Pump, The Double-action Sinking, Inventions Exhibition, 272
De Bange Gun, The Antwerp Exhibition, 123, 126
Devoll and Howl, Messrs., Brass Lathe, 314
Dickson's Boiler, Testing, 213
Docwra and Son, Messrs., Diamond Boring Machine, Inventions Exhibition, 139
Douse, Mr. T. R., Arm and Table Pressing Machine, 354
Doutney, Mr. G., Attachment for Gas Cocks, 85

EASTERN and Midlands Railway, The, 101
Eastern Mill at Joddah, 8
Echaig Bridge, Messrs. Bell and Miller, 215, 220
Edis n Incandescent Lamp, Test of the, 226, 228
Edwards, Mr. H. C. Wynne, The Problem of Flight, 503
Elwell-Parker Four-pole Dynamo Electric Machine, Inventions Exhibition, 92, 93
Emperor Ferdinand's Northern Railway in Austria, Express Engine (*Supplement October 2nd*, 1885)
"Eureka" Lock-nut, The, Messrs. Bayliss, Jones, and Bayliss, 337
Evans, Mr. Fred., Scale for Depth and Width of Flat and Sunk Keys, 180
Eyre's Solid Forged Steel Wheels, Messrs. John Brown and Co., 448

FAIJA, Mr. Henry, Cement Mill and Testing Apparatus, Inventions Exhibition, 432
Field, Messrs., Apparatus for Purifying Ozokerit, 187
Fielding Engine, The, Figs. 3 and 4, 463
Fielding and Platt, Messrs., High-pressure Hydraulic Pumping Engine, Inventions Exhibition, 235
First Avenue Hotel, Holborn, Electric Light Engines, Messrs. J. and H. Gwynne, 456, 462
Fisher and Walker, Messrs., Friction Clutch, Inventions Exhibition, 82
Forbes, Prof., Non-polar Dynamo, Inventions Exhibition, 47, 48
Forth Bridge, Mr. Baker on the, 195
Forth Bridge, Messrs. Baker and Fowler, 284, 285, 299
Franklin Institute, Method of Testing Boilers for the Report issued by, 188
Furness and Co., Messrs. W., Combined Rack and Rope-feed Saw-bench, 315
Furness and Co, Messrs. W., Tobacco Spinning Machine, 448

GALLOWAY and Sons, Messrs., Compound Engine, Inventions Exhibition, 436
Gantoch Rocks, Gas Beacon, 145
Ganz and Co., Messrs., Induction Coils and Transformators, Fig. 2, Fig. 5, 430, 431
Garrett and Sons, Messrs. R., Fire-boxes of Straw-burning Engines, 177, 179
Garrett and Sons, Messrs. Richard, Seed Drill, Smithfield Club Show, 461
Garrett and Sons, Messrs. Richard, Spark Arrester, Smithfield Club Show, 459
Gaulard and Gibbs, Messrs., Induction Coils, Fig. 1, 430
Gibbons, Mr. H., Moulding Machine, 360
Gilliers, Mr. Jas., Equilibrium Steam Trap, Glasgow Mining Exhibition, 401
Gillott and Sons, Messrs. John, Adjustable Piston, 431
Gramme Arc Lamp, The, 380
Great Southern and Western Railway of Ireland, Four-coupled Passenger Engine, Mr. J. A. F. Aspinall (*Supplement, July 17th*), 50
Greenwood and Batley, Messrs., "Jones" Dynamo-Electric Machines, Inventions Exhibition, 61
Gresham and Craven, Messrs., Self-acting Re-starting Injector, 372
Griffin's Pulveriser, 64
Gülcher Dynamos, Inventions Exhibition, 137, 138
Gulland, Mr. J. K., Diamond Boring Machine, Messrs. T. Docwra and Son, Inventions Exhibition, 139

HALL and Verity, Messrs., Flexible Coupling, 332
Hall and Verity, Messrs., Patent Crank Shaft, 256
Halley, Mr. D., English and Foreign Steam Engines, Mean Pressure Tables, 278
Hamilton, Mr. J., Planer, 381
Harrison Boiler, Testing the, 213
Harrison, Mr. J., Furnaces, 216
Hartley and Arnoux, Messrs., Tubular Vertical Boiler, 372
Hathorn, Davey, and Co., Messrs., Deep Well Pumps and Domestic Motor, Inventions Exhibition, 81
Hathorn, Davy, and Co., Messrs., Differential Valve Gear, Inventions Exhibition, 145
Hawke, Mr. S. R., Lifting Injectors, 503
Hedges, Mr. K., Switches and Cut-outs, Inventions Exhibition, 352
Henley-on-Thames Sewage Works, Mr. Shone's Hydro-Pneumatic Sewage Pumps, 140
Hetherington and Co., Messrs., Milling Machine, 400
Hooke, or Universal Joint, The, Fig. 1, 468
Horner and Adcock, Messrs., Expanding Boring Tool, 361
Howard, Messrs. J. and F., Arc Axle Plough, Smithfield Club Show, 460, 461
Howard, Messrs. J. and F., Light Permanent Way, Royal Agricultural Show, 56
Howard, Messrs. J. and F., Small Silo, Royal Agricultural Show, 55
Howell, Mr. Price, Bicycle Wheel Rim, 310
Huddersfield Station Roof, Fall of the, 370, 371
Huddersfield Station Roof, 451, 473
Hull, Barnsley, and West Riding Junction Railway, Stations on the, 72

INDIAN State Railways, Bridges for, 238, 239
Indian State Railways, Third-class Carriage, 414
Indian State Railways, Goods Engine, 437
Inventions Exhibition, Electrical Engineering at, 47, 61, 92, 93, 110
Inventions Exhibition, Gas Engines at, 61, 99, 257
Inventions Exhibition, Miscellaneous Machinery at, 80, 81, 88, 111
"Ireland," The City of Dublin Steam Packet Company's Mail Steamer, 200, 204
"Ireland," The City of Dublin Steam Packet Company's New Mail Steamer, Messrs. Laird Bros., 160, 182
"Ireland," Mail Steamer, Cross Sections through Boiler and Engine Room, Messrs. Laird Bros., 158, 182

JOHNSON'S Patent Rolled Wire Lathing, Messrs. R. Johnson, Clapham, and Morris, 441
Johnson and Morris, Messrs. R., Corrugated Wire Lathing, 85
"Jones'" Dynamo, Armature of the, Inventions Exhibition, 61

KAPP, Dynamo, 85
Keen and Sonnenthal, Messrs., Double Hook Pipe Wrench, 358
Kelly, Mr., Revolving Head, 494
Kendal and Gent, Messrs., Milling and Slotting Machine, 433
Kent, Mr. George, "Uniform" Meter, Inventions Exhibition, 310
Kerchove, Mr. Van den, 400-H.P. Corliss Engine, Antwerp Exhibition, 350, 353, 356

LANCASTER, Mr. I., Problem of Flight, 87
La Société Cockerill, Compound Engines at the Antwerp Exhibition, 211, 222
Lee and Sons, Messrs. James, Link Belt, 12
Légé and Co., Messrs., Tide Gauge, Inventions Exhibition, 332
Letheby-Bunsen Photometer, The, 227
Lines and Bridgman, Messrs., Box-nailing Machine, Inventions Exhibition, 117
Linnel, Messrs. Allchin, Thrashing Machine Drum, Royal Agricultural Show, 55
London and Colonial Engineering Company, the Climax Vertical Engine, 169
London and Colonial Engineering Company, Compound Surface Condensing Marine Engine, 260, 261

MCLAREN, Messrs. J. and H., High-speed Traction Engine for India, 495
Maginnis, Mr. A. J., on Steel Boilers, 447, 448, 449
"Manchester" Dynamo, The, Inventions Exhibition, 110
March, Mr. W., Sweeping and Elevating Machine, 94
Marshall, Mr. C. A., Testing Micrometer, 261
Marshall, Sons, and Co., Messrs., Chimney-lifter, 49
Marshall and Co., Messrs. J. T., Portable Engine, Smithfield Club Show, 460
Mather and Platt, Messrs., Diagonal Engine and "Manchester" Dynamo, Inventions Exhibition, 110
Mather and Platt, Messrs., Improved Edison Dynamo, Inventions Exhibition, 110
"Melbourne," The Barge-loading Dredger, Messrs. Simons and Co. (*Supplement October 14th*, 1885), 336, 337, 376
"Melbourne," Compound Engines of the Dredger, 376, 392
Melling's Patent Water Meter, Inventions Exhibition, 310
Methven Slit and Burner, The, 227
Midland Station, Sketch Map, 487
Midland Railway, St. Pancras Extension, 489, 498
Mills, Mr. W., Instantaneous Boat Engaging and Disengaging Gear, 491
Moncrieff Gun Carriage for Russian Ironclads, 246
Morton and Thomson, Messrs. Alex., Ejector Condenser, Inventions Exhibition, 272
Mueller Incandescent Lamp, 227
Mumford, Mr. A. G., Donkey Pump, 253
Munden, Mr. W. J., Gas Engine with Automatic Valves, Inventions Exhibition, 361

NAEYER and Co., Messrs., Water-tube Boilers, Antwerp Exhibition (*Supplement December 4th*, 1885)
Nansouty, M. Max de, on Telegraphic Optique, 389, 409
National Agricultural Hall, Elevation of, 62
New York Harbour, Map of, Removal of Flood Rock, Hell Gate, 273
Niles Tool Works, Ohio Large Boring and Turning Mill, 315
Nottingham Waterworks, Covered Service Reservoir, Mr. Ogle Tarbotton, 27

OERLIKON Machine Company, Chilled Roller Grooving and Polishing Machine, 502
O'Keefe and Robson, Messrs., Self-acting Tramway Point, 292
Ormerod, Grierson, and Co., Messrs. Cummin's Cotton Baling Press, Inventions Exhibition, 64, 65
Orwell Works, Early Four-furrow Balance Steam Plough, Mr. Worby, Royal Agricultural Show, 55
Otto *v.* Steel, 462
Otto *v.* Steel, The Otto Machines, 455
Otway, Mr. G., Barrow-loading Brick-cutting Table, 491

PARIS and St. Germain Railway, Tank Engine, Messrs. Cail et Cie., Antwerp Exhibition, 411
Patterson, Mr., Portable Drilling and Tapping Apparatus, 34
Patterson and Cooper, Messrs., Dynamo-electric Machines, Inventions Exhibition, 9, 10, 47
Paxman, Mr., Flue Tube, Smithfield Club Show, 459
Pearse, Mr. Lionel, Friction Still, 432
Pennsylvania and Reading Railway, Passenger Engine, Erie Railway Shops, Susquehanna, 396
Phillips, Mr. David, Zinc in Marine Boilers, 423
"Phlégéton," Balanced Valves of the, 295
"Phlégéton," Engines and Boilers of the French War Vessel, La Société Anonyme Claparéde, Antwerp Exhibition, 276, 277, 293, 303
"Phlégéton," Pumping Machinery of the, 318
Phœnix Flour Mills, Newcastle-on-Tyne, Mr. J. H. Carter, 452, 453
Pinchbeck, Mr. John, Engine, 487
Poyser, Mr. J., Railway Chair, Inventions Exhibition, 388
Preston Royal Agricultural Society's Showyard, Map of, 23
Price and Belsham, Messrs., Drill, Inventions Exhibition, 81
Proel Expansion Gear, Messrs. Robey and Co., Smithfield Club Show, 460

RAMSDEN, Mr. T. H., Combined Horse-rake and Haymaker, Royal Agricultural Show, 55
Rapier's Pendulum Titan, 382
Reed and Co., Messrs. W., Disengaging and Hooking on Hooks, Inventions Exhibition, 81
Richardson's Electric Regulator applied to Robey's Semi-fixed Engine, 51
Richmond and Chandler, Messrs., Hodgkinson's Dough Mixer, Royal Agricultural Show, 56
Rigg, Mr. James, Coal-loading Machinery, Inventions Exhibition, 2, 3, 4
Riley and Hill, Messrs., Curious Specimens of Lead Pipe and Joints, 216
Robertson, Mr. W., Hydraulic Ram, 351
Robey, Mr., Semi-fixed Engine, with Richardson's Electric Regulator, 51
Robey and Co., Messrs., Engine fitted with the Corliss Apparatus, Inventions Exhibition, 111
Robey and Co.'s, Messrs., Engine with Proel's Valve Gear, Inventions Exhibition, 106
Root Boiler, Testing the, 205
Rose, Downs, and Thompson, Messrs., Export Oil Mill, 145
Roundthwaite, Mr., Semi-portable Boiler, 216, 259
Rushworth and Co., Messrs., Seven Roller Plate Flattening Machine, 341
Rushworth and Co., Messrs., Vertical Angle and T-Iron Bending Machine, 103

SCHISCHAR and Harrison, Messrs., Vertical Boring Mill, Inventions Exhibition, 436
Schwackhofer, Herr Fr., Calorimeter, 34
"Scout," Twin Screw Engines of H.M.S., Messrs. J. and G. Thomson, 473
Seine, Compound Engines for Passenger Boats on the, 122
Selig, Sonnenthal, and Co., Messrs., Band Saw Filing Machine, 361
Shone, Mr., Hydro-pneumatic Sewage Pumps, Henley-on-Thames Sewage Works, 140
Simpson and Shipton, Messrs., Rotary Engine, 309
Smith, Prof. R. H., On the Cut-off in the Large Cylinder Diagrams of Compound Engines, 407
Smith, Prof. R. H., Graphic Kinematics of Machinery, 79, 80
Smith, Prof. R. H., Horse-power of Turbines—Diagrams, 175, 233
Société Cockerill, La, Compound Engines at the Antwerp Exhibition, 211, 222
South Indian Railway, Iron Roofs, 316
Sparke, Mr., Revolving Stuffing-box, 491
Spencer and Co., Messrs., 50-h.p. Vertical Compound Mill Engine, 30
Stanhope Water Purifier and Softener, The, 236
Stanley, Mr. W. F., Protractor, 85
Stanley Thompson Incandescent Lamp, Test of the, 226, 228
S.S. "Calabria," Condensers on Board the, Mr. J. Kirkaldy, 333
S.S. "Eastwood," Triple Expansion Engines of, Earle's Shipbuilding and Engineering Company (*Supplement, July 3rd*, 1885), 11
Stettin Harbour, 40-ton Floating Crane, 6, 7
Stevens, Mr. F. W., Rail Fastenings, 472
Stevens and Major, Messrs., Lift, Inventions Exhibition, 271
Stevenson and Co., Messrs. J. C., Vertical Flour Mill Engines, 401
Stothert and Pitt, Messrs., Steam Excavating Crane, Inventions Exhibition, 349
Stratford-on-Avon Waterworks, Details of Reservoirs and Embankment, Mr. E. Pritchard, 415, 416, 418
Stroudley, Mr., Diagrams from one of his Compound Locomotives, 329
Stroudley, Mr., Indicator Diagrams taken from Engine (Class C), 390
Syrinx Engine, The, Messrs. Clarke and Gillespie Inventions Exhibition, 360, 361

TATHAM Dynamometer, The, 502
Tay Bridge Piers, Sinking the Caissons of by Pontoons, 25
Tay, The New Viaduct over the, 248
Thom, Mr. John, Patent Valves, 297
Thomson-Houston Dynamo, The, Inventions Exhibition, 157
Thwaite and Neville, Messrs., Hoisting and Traversing Crane, 314
Toward and Co., Messrs. T., "Genetic" Multitubular Boiler, 495
Tower Engine, The, Figs. 1 and 2, 468
Tweddell, Platt and Fielding, Messrs., Hydraulic Forging Press, Inventions Exhibition, 234
Tweddell, Platt, Fielding, and Boyd, Messrs., Hydraulic Flanging Machine, Inventions Exhibition, 236
Tweddell, Mr. R. H., 150-ton Rivetting Machine, Inventions Exhibition, 83, 103, 111

UNITED States Patent-office, Cheap Horse Corn Planter, 34
Unwin, Professor W. C., Autographic Stress Diagrams, 158

VAN den Kerchove, M., Valve Gear of his Corliss Engine, Antwerp Exhibition, 350, 353
Vesey, Mr. Arthur H., Dr. Felix Semon and Mr. F. Weiss, An Improved Laryngoscope, 481
Victoria Dynamo, Inventions Exhibition, 193
Victoria and Gülcher, Dynamos, Inventions Exhibition, Sketch Showing Mode of Connecting Opposite Coils, Fig. 3, p. 62
Volk, Mr. Magnus, Gas Engine Governor Attachment, 292
Vulcan Foundry Company, Swivel Bogie Locomotive, Inventions Exhibition, 84, 85, 112

WADDINGTON, Mr. John, Accessory to the Screw Propeller, 401
Wainwright and Slayner, Messrs., Universal Coal Borer, Inventions Exhibition, 311
Wallsend Slipway Company, Triple Expansion Engines with Joy's Valve Gear, Inventions Exhibition, 68, 73
Webb, Professor J. Burkitt, Draught Gauge, 24
Webb's Patent Compound Locomotive for the Companhia Paulista (*Supplement October 30th*, 1885), 280
Wedlake, Mr., Organ, Inventions Exhibition, 369, 373
Wem Waterworks, Mr. T. S. Stooke, 218, 219, 220
Westinghouse Brake Company, The Stand of the, Inventions Exhibition, 141
Westminster Abbey, New Organ, Messrs. W. Hill and Son (*Supplement August 21st*), pp. 164, 168
Weston, Mr., Centrifugal Friction Pulley, Inventions Exhibition, 347
Weston Incandescent Lamp, Test of the, 226, 228
Wethered, Mr. E. R., Lock, 317
Whitehead and Co., Messrs., Pug Mill, Royal Agricultural Show, 56
Wicksteed, Mr. C., Tube Beader, 265
Wild's Excavator, Inventions Exhibition, 348
Willmott, Mr. J. W., Double Sluice Valve for Despatching "Carriers" Containing Telegrams, 399
Woodhouse-Rawson Incandescent Lamp, Test of the, 226, 228
Worsdell, Mr., Diagrams from one of his Compound Locomotives, 329

YOUNG, Mr. Frederick E., Expansion Coupling, 448

SUBJECT MATTER.

"A" COIL Underneath, Appearance of, 247
Adit Well at Arbroath, 296
Air Cooler, Mr. J. Chambers, 131
Arc Lamp, The Gramme, 380
Arm and Table Pressing Machine, Mr. T. R. Douse, 354
Armature of the "Jones" Dynamo, Inventions Exhibition, 61
Axle and Axle-box, Mr. W. L. Banting, Inventions Exhibition, 393

BAND Saw Filing Machine, Messrs. Selig, Sonnenthal, and Co., 361
Barrow-loading Brick-cutting Table, Mr. G. Otway, 491

Bending Vertical Angle and T-Iron, Messrs. Rushworth and Co., 103
Bevel Gauge, Triangular, The Britannia Company, 494
Bevel Gear Cutting Machine, Messrs. Brehmer Brothers, 35
Bevelling Angle Iron for Ships' Frames, Arthur's Machine for, Messrs. Davis and Primrose, 393
Bicycle Wheel Rim, Mr. Price Howell, 310
Boat Engaging and Disengaging Gear, Instantaneous, Mr. W. Mills, 491
Boats, Berthon, 67
Boiler and Engine-room, Cross Section through, Mail s. "Ireland," Messrs. Laird Brothers, 158, 182
Boiler, "Genetic" Multitubular, Messrs. T. Toward and Co., 495
Boiler Plates, Mr. A. J. Maginnis on, 447, 448
Boiler, Semi-portable, Mr. Roundthwaite, 216, 250
Boiler, Tubular Vertical, Messrs. Hartley and Arnoux, 372
Boilers, American, Testing, 188, 205, 213
Boilers, Cracked Steel, Mr. A. J. Maginnis, 447, 448
Boilers, Method of Testing, for the Report issued by the Franklin Institute, 188
Boilers, Water-tube, Messrs. Naeyer and Co., Antwerp Exhibition (*Supplement December 5th*, 1885)
Boring Mill, Vertical, Messrs. Schischkar and Harrison, Inventions Exhibition, 436
Boring Tubes of Diamond Boring Machine, invented by Mr. J. K. Gulland, exhibited by Messrs. Doewra and Son, Inventions Exhibition, 139
Box-nailing Machine, Messrs. Lines and Bridgman, Inventions Exhibition, 117
Brake, Automatic Vacuum, The Automatic Vacuum Brake Company, Inventions Exhibition, 298
Brake Company, Stand of the Westinghouse, at the Inventions Exhibition, 141
Bridge, The Albert, 429
Bridge, Echaig, Messrs. Bell and Miller, 215, 220
Bridge, The Forth, Mr. Baker on, 195
Bridge, The Forth, Messrs. Baker and Fowler, 284, 285, 299
Bridge Project, The Danube, Culmann's Graphic Treatment of Elastic Arches, Mr. R. H. Graham, 41, 42, 43
Bridge, Suspension, at Abergeldie, Messrs. Blaikie Brothers, 102
Bridges for the Indian State Railways, 238, 239
Bridge, The Tay, 248

CABLE Gripper, Improved, Mr. David B. Anders, 212
Caissons of the Tay Bridge Piers by Pontoons, Sinking the, 25
Calorimeter, Herr Fr. Schwackhofer, 34
Cement Mill and Testing Apparatus, Mr. Henry Faija, Inventions Exhibition, 432
Centrifugal Friction Pulley, Mr. Weston, Inventions Exhibition, 347
Cheap Horse Corn Planter, United States Patent-office, 34
Chilled Roller Grooving and Polishing Machine, The Oerlik, 502
Chimney Climber, Messrs. Brown and Porter, 131
Chimney Lifter, Messrs. Marshall, Sons, and Co., 49
Coal Borer, The Acme, Inventions Exhibition, 311
Coal Borer, Universal, Messrs. Wainwright and Stayner, Inventions Exhibition, 311
Coal-loading Machinery, Mr. James Rigg, Inventions Exhibition, 2, 3, 4
Condensers on Board the s.s. "Calabria," Mr. J. Kirkaldy, 333
Cotton Baling Press, Cummin's, exhibited by Messrs. Ormerod, Grierson, and Co., Inventions Exhibition, 64, 65
Coupling, Flexible, Messrs. Hall and Verity, 352
Crane, 15-ton Forge, Messrs. Abbott and Co., 178, 180
Crane, Steam Derrick, Messrs. G. Anderson and Co., Inventions Exhibition, 349
Crane, Steam Excavating, Messrs. Stothert and Pitt, Inventions Exhibition, 349
Crane, 40-ton Floating, Stettin Harbour, 6, 7
Crank Shaft, Messrs. Hall and Verity, 256
Cut-off in the Large Cylinder of Compound Engines, Professor R. H. Smith on the, 407

DIAGRAMS from Mr. Stroudley's Compound Locomotive, 329
Diagrams from Mr. Worsdell's Compound Locomotive, 329
Diamond Boring Machine, Mr. J. K. Gulland, Messrs. T. Doewra and Son, Inventions Exhibition, 139
Disintegrator, Mr. J. H. Carter, Royal Agricultural Show, 56
Donkey Pump, Mr. A. G. Mumford, 256
Double Sluice Valve for Despatching "Carriers" Containing Telegrams, Mr. J. W. Wilmot, 399
Dough Mixer, Hodgkinson's, shown by Messrs. Richmond and Chandler, Royal Agricultural Show, 56
Draught Gauge, Professor J. Burkitt Webb, 24
Dredger "Melbourne," The Barge-loading, Messrs. Simons and Co. (*Supplement October 16th*, 1885), 336, 337, 378
Dredger, Single Chain Grab, Mr. H. J. Coles, 310
Drill, Messrs. Price and Belsham, Inventions Exhibition, 81
Drilling and Tapping Apparatus, Portable, Mr. Patterson, 34
Dynamo-electric Machine, The Elwell-Parker Four-pole, Inventions Exhibition, 92, 93
Dynamo-electric Machines, Jones, as shown by Messrs. Greenwood and Batley, Inventions Exhibition, 61
Dynamo-electric Machines, Messrs. Patterson and Cooper, Inventions Exhibition, 9, 10, 47
Dynamo, Improved Edison, Messrs. Mather and Platt, Inventions Exhibition, 110
Dynamo, The Kapp, 85
Dynamo, The "Manchester," Inventions Exhibition, 110
Dynamo, Non-polar, Prof. Forbes, Inventions Exhibition, 47, 48
Dynamo, The Thomson-Houston, 157
Dynamo, The Victoria, Inventions Exhibition, 193
Dynamos, The Anglo-American Brush Electric Light Corporation, Inventions Exhibition, 193
Dynamos, Gülcher, Inventions Exhibition, 137, 138
Dynamos, Victoria and Gülcher, Inventions Exhibition, sketch showing Mode of Connecting Opposite Coils, Fig. 3, p. 62
Dynamos, Messrs. J. F. D. Andrews, Inventions Exhibition, sketch showing Mode of Connecting Opposite Coils, Fig. 3, p. 62
Dynamometer, The Tatham, 502

EFFICIENCY of American Steam Boilers, 188, 205, 213, 214
Ejector Condenser, Messrs. Alex. Morton and Thomson, Inventions Exhibition, 272
Electric Light Engines, First Avenue Hotel, Holborn, Messrs. J. and H. Gwynne, 456, 462
Electric Light Installation, Antwerp, 387
Electric Regulator, Richardson's, applied to Robey's Semi-fixed Engine, 51
Electrical Engineering at the Inventions Exhibition, 47, 61, 92, 93, 110
Electrical Engineering at the Inventions Exhibition, Victoria Dynamo, 193
Equilibrium Steam Trap, Mr. Jas. Gillies, Glasgow Mining Exhibition, 401
Engine, Mr. Bennison, 487
Engine, Mr. John Punchbeck, 487
Engine, Atkinson's Gas, The British Gas Engine Company, Inventions Exhibition, 480, 481
Engine, The Clerk Gas, Messrs. L. Sterne and Co., Inventions Exhibition, 257
Engine, The Climax Vertical Gas, London and Colonial Engineering Company, 169
Engine, Gas, at the Inventions Exhibition, 61, 99, 257, 360, 480, 481
Engine, Gas, Mr. James Atkinson, Diagram Showing Ignition of a Full Charge, 57
Engine, Compound, Messrs. Galloway and Sons, Inventions Exhibition, 436
Engine, Compound, fitted with Trick Valves, La Société Cockerill, Fig. 2, p. 211 and 222
Engine, Condensing, Messrs. Bollinckx, Antwerp Exhibition, 469, 476
Engine, Diagonal, and "Manchester" Dynamo, Messrs. Mather and Platt, Inventions Exhibition, 110
Engine, Express, Emperor Ferdinand's Northern Railway in Austria, October 2nd, 1885
Engine, The Fielding, Figs. 3 and 4, p. 468
Engine fitted with the Corliss Apparatus, Messrs. Robey and Co., Inventions Exhibition, 111
Engine, Four-coupled Passenger, Great Southern and Western Railway of Ireland, Mr. J. A. F. Aspinall (*Supplement July 17th*), 50
Engine, 400-H.P. Corliss, Mr. Van den Kerchove, Antwerp Exhibition, 350, 353, 356
Engine, Gas, with Automatic Valves, Mr. W. J. Munden, Inventions Exhibition, 361
Engine, Goods, Indian State Railways, 437
Engine, Grasshopper, Eagle Foundry, Birmingham, 123
Engine, High-speed Traction, for India, Messrs. J. and H. McLaren, 495
Engine and Kapp Dynamo, Combined Allen, Messrs. W. H. Allen and Co., Inventions Exhibition, 85
Engine, Passenger, Pennsylvania and Reading Railway, Erie Railway Shops, Susquehanna, 396
Engine, Portable, Messrs. J. T. Marshall and Co., Smithfield Club Show, 460
Engine with Proel's Valve Gear, Messrs. Robey and Co., Inventions Exhibition, 106
Engine, Rotary, Messrs. Simpson and Shipton, 309
Engine, Semi-fixed, Mr. Robey, with Richardson's Electric Regulator, 51
Engine Steering Gear, Traction, Messrs. Aveling and Porter, 503
Engine, The Syrinx, Messrs. Clarke and Gillespie, Inventions Exhibition, 360, 361
Engine, Tank, Paris and St. Germain Railway, Antwerp Exhibition, Messrs. Cail and Cie., 411
Engine, The Towers, Figs. 1 and 2, p. 468
Engine, Vertical Compound Mill, Messrs. Spencer and Co., 30
Engines and Boilers of the French War Vessel Phlégéton, La Société Anonyme Claparede, Antwerp Exhibition, 276, 277, 293, 303
Engines, Compound, at the Antwerp Exhibition, La Société Cockerill, 211, 222
Engines, Compound, at the Antwerp Exhibition, La Société Cockerill, 242
Engines, Compound, of the Dredger "Melbourne," 376, 392
Engines, Compound, for Passenger Boats on the Seine, 122
Engines, Compound, La Société Cockerill, Antwerp Exhibition, 222
Engines, English and Foreign Steam, Mr. D. Halley, Mean Pressure Diagrams, 278
Engines, Express Passenger, for Steep Gradients, Belgian State Railway, 197, 204
Engines, Inclined Shaft Rotary Engines, 468
Engines with Joy's Valve Gear, Triple Expansion, Wallsend Slipway Company, Inventions Exhibition, 68, 73
Engines, Triple Expansion, of the s.s. "Eastwood," Earle's Shipbuilding Company (*Supplement, July 3rd*), 11
Engines, Twin Screw, of H.M.S. "Scout," Messrs. J. and G. Thomson, 473
Excavator, Wild's, Inventions Exhibition, 348
Excentric Patent, Messrs. Bray and Heald, 360
Exhibition, The Antwerp, General Plan of, 119
Exhibition, The Budapest National, 196, 198
Expanding Boring Tool, Messrs. Horner and Adcock, 361
Expansion Coupling, Mr. Fred. E. Young, 448
Expansion Gear, The Proel, Messrs. Robey and Co., Smithfield Club Show, 460

FALL of the Huddersfield Station Roof, 370, 371
Fire-boxes of Straw-burning Engines, Messrs. R. Garrett and Sons, 177, 179
Floodgate, Automatic, M. D. Cvetkovic, 131
Flour Mill Engines, Vertical, Messrs. J. C. Stevenson and Co., 401
Flour Mills, The Phœnix, Newcastle-on-Tyne, Mr. J. H. Carter, 452, 453
Flue Tube, Mr. Paxman, Smithfield Club Show, 459
Forging Press, Hydraulic, Mr. Henry Barry, 337
Friction Clutch, Messrs. Fisher and Walker, Inventions Exhibition, 82
Friction Still, Mr. Lionel Pearse, 432
Furnaces, Mr. J. Harrison, 216

GAS Beacon, Gantoch Rocks, 145
Gas Cocks, Attachment for, Mr. G. Doutney, 85
Gas Engine, Differential, Mr. Atkinson, Inventions Exhibition, 99
Gas Engines at the Inventions Exhibition, 61, 99, 257, 360, 361, 480, 481
Gas Engine Governor Attachment, Mr. Magnus Volk, 292
Girders, Moving a Pair of Large, 204
Graphic Kinematics of Machinery, Professor R. H. Smith, 79, 80
Gun, The De Bange, Antwerp Exhibition, 123, 126
Gun Carriage, Moncrieff, for Russian Ironclads, 246
Gun-cotton, Destruction of Guns at Alexandria by, 247
Guns, Riband, Captain E. Bosch on, 294

HELL Gate Rocks, New York Harbour, Removal of, 273
Hoisting and Traversing Cranes, Messrs. Thwaite and Neville, 314
Hooks, Boat, Messrs. W. Reed and Co., Inventions Exhibition, 81
Horse-rake and Haymaker, Combined, Mr. T. H. Ramsden, Royal Agricultural Show, 55
Hydraulic Flanging Machine, Messrs. Tweddell, Platt, Fielding, and Boyd, Inventions Exhibition, 236
Hydraulic Forging Press, Messrs. Tweddell, Platt, and Fielding, Inventions Exhibition, 234
Hydraulic Pump, Broxbourn Colliery, Mr. J. Moore, 265
Hydraulic Pumping Engine, High-pressure, Messrs. Fielding and Platt, Inventions Exhibition, 235
Hydraulic Ram, Mr. W. Robertson, 351
Hydro-pneumatic Sewage Pumps, Mr. Shone's, Henley-on-Thames Sewage Works, 140

INDICATOR, Blythswood, Sir A. C. Campbell, Inventions Exhibition, 400
Indicator Diagrams, A Problem in, 503
Induction Coils, Fig. 1, Messrs. Gaulard and Gibbs, 430
Induction Coils, Fig. 2, p. 430, and Transformators, Messrs. Ganz and Co., Fig. 5, p. 431
Injector, Self-acting Re-starting, Messrs. Gresham and Craven, 372
Injectors, Lifting, Mr. S. R. Hawke, 503
Incandescent Lamp, The Mueller, 227
Incandescent Lamps, The Stanley-Thomson, Woodhouse-Rawson, Weston and Edison, 226
Iron Roof, South Indian Railway, 316
Iron Wagons, Cawnpore-Achnera Railway, 86

JOINT, The "Hooke" or Universal, Fig. 1, p. 468

KEYS, Flat or Sunk, Mr. Fred. Evans, 180

LAMP-HOLDER, Revolving, 227
Lantern for Light Apparatus of the Second Order, Watling Island, Bahama, 255
Laryngoscope, An Improved, Mr. A. Vesey, Dr. F. Semon, and Mr. F. Weiss, 481
Lathe, Brass, Messrs. Devoll and Howl, 314
Lathe, General Purpose, The Britannia Company, 494
Lathing, Johnson's Rolled Wire, Messrs. R. Johnson, Clapham and Morris, 441
Lead Pipes and Joints, Curious Specimens of, Messrs. Riley and Hill, 216
Locomotive Swivel Bogie, The Vulcan Foundry Company, Inventions Exhibition, 84, 85, 112
Lift, Messrs. Stevens and Major, Inventions Exhibition, 271
Link Bell, Messrs. James Lee and Sons, 12
Lock, Messrs. Brown and Guinery, 317, 334
Lock, Mr. E. R. Wethered, 317
Lock-nut, The Eureka, Messrs. Baylis, Jones and Baylis, 337
Locomotive, American, for New Zealand, Messrs. Burnham, Parry, and Williams, 422
Locomotives, Compound, Indicator Diagrams, Mr. Stroudley, 390
Locomotive, Webb's Compound, for the Companhia Paulista (*Supplement October 30th, 1885*), 280

MAIL Steamer "Ireland," The City of Dublin Steam Packet Company's, 200, 204
Map of the Royal Agricultural Society's Showyard, Preston, 23
Map Sketch, Midland Station, 487
Marine Engine, Compound Surface Condensing, London and Colonial Engineering Company, 260, 261
Mechanical Movement, Cameron's, 309
Meter, "Uniform," Mr. George Kent, Inventions Exhibition, 310
Meter, Water, Melling's, Inventions Exhibition, 310
Micrometer Testing, Mr. C. A. Marshall, 261
Mill, Large Boring and Turning, Niles Tool Works, Ohio, 315
Mill at Jeddah, Eastern, 8
Milling Machine, Messrs. Hetherington and Co., 400
Milling and Slotting Machine, Messrs. Kendal and Gent, 433
Miscellaneous Machinery at the Inventions Exhibition, 80, 81, 88, 111
Motor, Water, Mr. Sealey Allin, Inventions Exhibition, 311
Moulding Machine, Mr. H. Gibbons, 360

NATIONAL Agricultural Hall, Elevation of, 62

OIL Mill, Export, Messrs. Rose, Downs, and Thompson, 145
Ordnance, Destruction of, by Gun-cotton, 247
Organ Keys and their Attachments, Mr. Wedlake, Inventions Exhibition, 369, 373
Organ, The New, Westminster Abbey (*Supplement August 21st*), Messrs. W. Hill and Son, 164, 168
Ozokerit, Apparatus for Purifying, Messrs. Field, 187

PEAT Breaking Machine, Mr. Bracher, Royal Agricultural Show, 55
Pendulum Titan, Rapier's, 382
Permanent Way, Light, Messrs. J. and F. Howard, Royal Agricultural Show, 56
Photometer, The Letheby-Bunsen, 227
Pipe Wrench, Double Hook, Messrs. Koon and Sonnenthal, 353
Piston, Adjustable, Messrs. John Gillott and Sons, 481
Planer, Mr. J. Hamilton, 381
Plate Flattening Machine, Seven-roller, Messrs. Rushworth and Co., 341
Plough, Arc Axle, Messrs. J. and F. Howard, Smithfield Club Show, 460, 461
Plough, Early Four-furrow Balance Steam, Orwell Works, Mr. Worby, Royal Agricultural Show, 55
Problem of Flight, Mr. H. C. Wynne Edwards, 503
Problem of Flight, Mr. I. Lancaster, 87
Propeller Shaft, Mr. Arrowsmith, 51
Protractor, Mr. W. F. Stanley, 85
Pug Mill, Messrs. Whitehead and Co., Royal Agricultural show, 56
Pulveriser, Griffin's, 64
Pump, Sinking, The Double-action Deane, Inventions Exhibition, 272
Pumping Machinery of the "Phlégéton," 318
Pumps, Deep Well, and Domestic Motor, Messrs. Hathorne, Davey, and Co., Inventions Exhibition, 81
Pumps, Large Thick Slurry, Mr. A. H. Beasley, 472

RACK and Rope-feed Saw Bench, Combined, Messrs. W. Furness and Co., 315
Radial Drilling and Boring Machine, Mr. W. Asquith, 381
Rail Fastenings, Mr. F. W. Stevens, 472
Railway Chair, Mr. J. Poyser, Inventions Exhibition, 388
Railway, The Eastern and Midlands, 101
Refrigerating Machine, Mr. J. Chambers, 130
Reservoir, Covered Service, Nottingham Waterworks, Mr. Ogle Tarbotton, 27
Revolving Lathe Head, Mr. Kelly, 494
Rivetting Machine, 150-ton, Mr. R. H. Tweddell, Inventions Exhibition, 88, 103, 111
Roof, Huddersfield Station, 370, 451, 473

SCREW Propeller, Accessory to the, Mr. John Waddington, 401
Seed Drill, Messrs. Richard Garrett and Sons, Smithfield Club Show, 461
Sewage Work, Henley-on-Thames, Mr. Shone's Hydro-pneumatic Sewage Pumps, 140
Silo, Small, Messrs. J. and F. Howard, Royal Agricultural Show, 55
Slide Valve and Steam Port, Section of, 271
Slit and Burner, The Methven, 227
Smithy Roof, Central India Railway, 274
Spark Arrester, Messrs. Richard Garrett and Sons, Smithfield Club Show, 459
Standard Daniell Cell, 150
Stations on the Hull, Barnsley, and West Riding Junction Railway, 72
Steamer "Ireland," The City of Dublin Steam Packet Company's, Messrs. Laird Bros., 160, 162
Steel, Otto's, 462
Steel Wheels, Eyre's Patent Solid Forged, Messrs. John Brown and Co., 448
Stress Diagrams, Autographic, Prof. W. C. Unwin's, 158
Ships of War, Distribution of Armour in, Camperdown Belted, Mr. W. E. Smith on, 100
Stuffing-box, Revolving, Mr. Sparke, 491
Sweeping and Elevating Machine, Mr. W. March, 94
Switches and Cut-outs, Mr. K. Hedges, Inventions Exhibition, 352

TARGET, The Cadiz, 247
Tay Bridge, 248
Telegraphy by Sight Signalling, M. Max de Nansouty, 389, 409
Testing American Steam Boilers, 188, 205, 213, 214
Third-class Carriage, Indian State Railways, 414
Thrashing Machine Drum, Messrs. Allchin, Linnell, Royal Agricultural Show, 55
Tide-gauge, Messrs. Légé and Co., Inventions Exhibition, 332
Tobacco Spinning Machine, Messrs. W. Furness and Co., 448
Tramway Point, Self-acting, Messrs. O'Keefe and Robson, 292
Trap and Gulley Combined, Mr. Ed. Cuthbert, 400
Trawler, Steam, for Brazil, Messrs. Cochran and Co., 382
Tube Beader, Mr. C. Wicksteed, 265
Turbines, Horse-power of, Prof. R. H. Smith, Diagrams, 175, 233

VALVE Gear, Mr. James Beveridge, 35
Valve Gear, Differential, Messrs. Hathorne, Davey, and Co., Inventions Exhibition, 145
Valve Gear of M. Van den Kerchove's Corliss Engine, Antwerp Exhibition, 350, 353
Valves, Balanced, of the "Phlégéton," 295
Valves, Patent, Mr. John Thom, 297
Ventilator, Bristol Council Hall, 380
Viaduct over the Tay, The New, 248

WATER Purifier and Softener, The Stanhope, 236
Water Tube Boiler, Development of a, The Babcock and Wilcox, 322, 323
Waterworks, Stratford-on-Avon, Details of Reservoirs and Embankment, Mr. E. Pritchard, 415, 416, 418
Waterworks, Wem, Mr. T. S. Stooke, 218, 219, 220
Wire Lathing, Corrugated, Messrs. R. Johnson and Morris, 85

Zinc in Marine Boilers, Mr. David Phillips, 423

Miscellaneous.

ABERGELDIE, Suspension Bridge at, 102
Adit, Driving an, 296, 334
Admiral Porter and the American Navy, 339
Agricultural Hall, The National, 62
Aid to Engineering Solution, 423
Air Vessels, 180
Alabama, The Iron and Coal Districts of, 1, 43
Albert Bridge, The, 429, 454
Allen and Co., Messrs., Engine and Kapp Dynamo, 85
Aluminum in the United States, Production of, 385
American Engines in New Zealand, 422
American Locomotives for New South Wales, 390
American Navy, Admiral Porter and the, 339
American Notes, 17, 28, 57, 75, 113, 133, 151, 171, 189, 207, 229, 250, 267, 287, 305, 325, 343, 363, 383, 403, 425, 443, 463, 484, 505
American Steam Boilers, Efficiency of, 188, 205, 213
American Steam Practice, 44
American Tea Trains, 307
Analysis of Water, New, 397
Anders, Mr. D. B., Improved Cable Gripper, 212
Angle and Tee-bending Machine, Messrs. Rushworth and Co., 108
Annual Report, 103
Antimony Ore in New South Wales, 264
Antwerp, Electric Light Installation, 387
Antwerp Exhibition Awards, 169, 206
Antwerp Quays, Inauguration of the, 91
Arbitration in the Iron Trade, 300
Arm and Table Pressing Machine, Mr. T. R. Douse, 354
Armour, Distribution of, in Ships of War, 53
Armour in Ships of War, Distribution of, 99
Armstrong Guns, 10in. and 12in., at Cadiz, 247
Arrowsmith's Propeller Shaft, 51
Arthur's Angle Iron Bevelling Machine, 393
Ashford, South-Eastern Railway Works, 51
Asquith, Mr. W., Radial Drilling and Boring Machine, 381
Asphalte for Bridge Floors, 69
Asphaltum in the United States, 216
Association, The American, for the Advancement of Science, 329
Association, London Sanitary Protection, 481
ASSOCIATION OF THE MANCHESTER STUDENTS:
Visit to the Liverpool New Waterworks on the River Vyrnwy, Mr. W. Spinks, 294
ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS, 120
Municipal and Sanitary Works of Blackburn, Mr. McCullum, 180
Visit to Stratford-on-Avon, 394
Atkinson, Mr., Differential Gas Engine, 99
Atkinson's Gas Engine, Inventions Exhibition, 480, 481
Autographic Stress and Strain Diagrams, Professor W. C. Unwin, 158
Automatic Vacuum Brake Company at the Inventions Exhibition, Exhibits of, 298, 300
Axle and Axle-box, Improved, 393

BAHAMAS, Watling Island, Lantern for Light Apparatus, 256
Baker, Mr. F., on the Forth Bridge, 241, 258
Balanced Valves of the "Phlégéton, 295, 303
Baldwin Boiler, The, 188, 213
Ballooning for Purposes of War, 70
Band Saw Filing Machine, Messrs. Selig, Sonnenthal, and Co., 361
Barnes' Boiler Feeder ? 107
Barrel Calorimeter, 205
Barrow-loading Brick-cutting Table, Otway's, 491
Basic Steel, 166
Bavarian Railway Jubilee, A, 494
Beams, Solid, 24, 57, 67
Bearings of Large Marine Engines, 31
Bedford, The Duke of, His Electric Launch, 481
Belgian Girder Question, The, 320
Belgian State Railways, Express Passenger Engines for Steep Gradients, 197, 204
Bell Buoys, 296
Belts, Those Plaguy, 96
Bench, Combined Rack and Rope Feed Saw, Messrs. W. Furness and Co., 315
Berthon Boats, 67
Bessbrook and Newby Electrical Tramway, 216
Bessemer Steel, Large Output of, 351
Bessemer Steel in the United States, 101
Bevel Gauge, Triangular, 494
Bevel Gear Cutting Machine, Messrs. Brehmer Bros., 35
Bevelling Machine, Arthur's Angle Iron, 393
Beveridge, Mr., Valve Gear, 35
Bicycle Wheel Rim, Mr. P. Howell, 310
Birmingham and its Pumping Engines, 108
Birmingham Ship Canal, 184
Blackburn, Municipal and Sanitary Works of, Mr. McCullum on, 180
Blast Furnaces of the United States, 363
Block Signalling, 217, 240
Block System, The, 57
Block System, Invention of the, 121
Blythswood Indicator, The, 400
Boat Engaging and Disengaging Gear, Mill's Instantaneous, 491
Boiler Efficiency, 278
Boiler Explosions, Anomaly in, 121
Boiler, The "Genetic" Multitubular, 495
Boiler, Hartley's Tubular Vertical, 372
Boiler Iron Gaol, A, 345
Boiler Joints, Rivetted, 180
Boiler Joints, Single Rivetted Lap, 142
Boiler, Roundthwaite's, 259
Boiler Together, Throwing a, 289
Boilers, The Deterioration of, 473
Boilers, Efficiency of, 259
Boilers, Efficiency of American, 188, 205, 213
Boilers with Forced Circulation, 13
Boilers, Locomotive, 170
Boilers, Mr. Roundthwaite's, 216
Boilers, Steam, as Magazines of Explosive Energy, 4
Boilers, Steel, 457
Boilers, Steel, Mr. A. J. Maginnis on their Failure, 447, 449
Boilers, Zinc in Marine, 451
Bollinckx, M., Condensing Engine, 469, 476
Books Received, 15, 167, 203, 226, 264, 321, 340
Boring Mill, Vertical, Messrs. Schischkar and Harrison, 436
Boring and Turning Mill, Large, 315
Bottomley, Mr. J. T., on the Electric Resistance of Platinoid, 5
Bottomley's Radial Axle, 24
Bournemouth Piers Competition, 416
Bournemouth Undercliff Competition, 391
Box Nailing Machine, Messrs. Lines and Bridgman, 117
Box, Mr. T., 124
Brake, The Automatic Vacuum, 298, 300
Brake Question on the Continent, The, 478
Brake Returns, Continuous, 240, 259, 278
Brakes, Emergency, 264
Brakes at the Inventions Exhibition, 298, 300
Brakes, Vacuum, 504
Brass Liners on Propeller Shafts? Putting, 107
Bray and Heald, Messrs., Patent Excentric, 360
Brazil, Steam Trawlers for, 383
Breech-loading Cartridges, New 40in., 359
Brehmer Brothers, Messrs., Bevel Gear Cutting Machine, 35
Bridge, The Forth, 284, 235, 292, 296, 299
Bridge, The Sukkur, 234
Bridge, Suspension, at Abergeldie, 102, 103
Bridge, The Tower, 340
Bridges for the Indian State Railways, 238, 239
Bridges, Strength of, 217
Bridgework, Novel Method of Erecting, 121
Bristol, Council House Ventilator, by Professor Hele-Shaw, 380
Bristol Merchant Venturers' School, The, 93
BRITISH ASSOCIATION, THE, 78, 173
Address of the President of the Mechanical Section, Mr. B. Baker on the Forth Bridge, 241, 258, 296
Arrangements for the Visit to Aberdeen, 173
Development of the Pneumatic System as Applied to Telegraph Purposes, Mr. J. W. Willmot, 397
Report on Underground Temperatures, 354
On the Strength of Round Timber, Mr. W. H. Preece, 388
British Association and Bridge Engineering, 203
British Columbia in London, The Representation of, 220
British Manufactured Goods in New South Wales, 144
British Navy and Sir N. Barnaby, K.C.B., 107
Brown and Porter, Messrs., Chimney Climber, 131
Broxbourn Colliery, Hydraulic Pump, Mr. J. Moore, 265
Budapest National Exhibition, 196, 198
Burial Places and Methods, Unsanitary, 90
Burmah, Steamers in, 408

CABLE Gripper, Improved, Mr. D. B. Anders, 212
Cadiz Target, The, 247
Cadiz, 10in. and 12in. Armstrong Guns at, 247
Calibration of Galvanometers by a Constant Current, Mr. T. Mather on the, 470
California, an Irrigation Canal in, 382
Calorimeter, Schwackhofer's, 34
Cameron's Mechanical Movement, 309
Camperdown Belted, The, 100
Canadian Pacific Railway, The, 359
Canal in California, An Irrigation, 382
Canal, Maritime, A Proposed New, 507
Carbon, Thermo-electric Position of, 24
Cardiff Coal Shipments, 71
Carron Science and Art Classes, 448
Cement Mill and Testing Apparatus, Faija's, 432
Centrifugal Friction Pulley, Mr. Weston, 347
Centrifugal Pump Patents, 54, 70
Ceylon, The Inland Waters of, 320
Ceylon Railways, 54
Chambers, Mr. J., Refrigerating Machine, 130
Chatham, Fatal Accident at, 150
Chatham Pier, Accident at, 94
Chester as a Seaport, 378
Chimney Climber, Messrs. Brown and Porter, 131
Chimney, Forced Draught by Revolving Screw in, 9
Chimney Lifter, Messrs. Marshall and Co., 49
Chimneys, Table of Sizes of, Mr. Wm. Kent, 159
Church's Slide Valves, 475
City of London and Coal, The, 302
Claparède and Cie., MM., Engines and Boilers of the "Phlégéton," 276, 277, 283, 293, 295
Clark on Sewerage, 339
Clarke and Gillespie, Messrs., 2-man Power Engine, known as the Syrinx Engine, 360, 361
Cleethorpes, 65
Clerkenwell Fire, The, 301
Clerk's Gas Engine at the Inventions Exhibition, 257
Cleveland, Ohio, Strike at, 37
Coal for Alexandria, 224
Coal Borer, The "Acme," 311
Coal Borer, The Universal, Messrs. Wainright and Stayner, 311
Coast Defences, Our, 358
Coal-fields of the North of France, 307
Coal-loading Machinery, Mr. Jas. Rigg, 2, 43
Coal Mine in New South Wales, New, 334
Coal Mines, Accidents in, 70
Coal Supply to London, 475
Coal Wagons, Fifty Miles of Loaded, 378
Coke Crushing and Flange Joints, 243
Coke in the United States, Production of, 289
Cole, Mr. H. J., Single Chain Grab Dredger, 310
Collieries, Threatened General Stoppage of, 282
Colliery Officials and the Government Inspectors, 108
Colne Valley Waterworks, 269
Colombo Waterworks, The, 440
Colonial Patents, 89
Colour Mixtures, Lecture Experiments on, 24
Combustion of Gunpowder in Guns, On the, 5
Commercial Electrolysis, 155
Commission of Trade Depression, 54
Commission on Trade, 198, 231
Companies, New, 19, 39, 59, 77, 97, 114, 135, 153
Compound Engine is Economical, Why the, 253
Compound Locomotives, 390
Conductors, On Problems in Networks of, 24
Conical Pendulum, A Point in the Theory of the, Mr. J. Lyon on, 467
Condensers on Board the s.s. "Calabria," 333
CONTRACTS OPEN:—
Bombay, Baroda, and Central India Railway, Specification for Materials for Parel Smithy Roof, 273
Indian State Railways, Bridges for, 238, 239
Indian State Railways Contract for Iron Bogie Wagons for the Cawnpore Achnera Railway, 86
South Indian Railway, Iron Roofs, 316
Third-class Carriages, Indian State Railways, 413, 414
Cooper's Hill, 244
Copper, New South Wales, 180
Copying Process, 31
Cork-cutting Machine? 13
Corn Planter, Cheap-horse, 34
Cotton Baling Press, Cummin's, 64, 65
Coupling, Expansion, 448
Coupling, Messrs. Hall and Verity's Flexible, 352
Couplings, Railway, 80, 151
Crane, Hoisting and Traversing, Messrs. Thwaite and Neville, 314
Crane, 15-ton Forge, 178, 180
Crane, 40-ton Floating, Stettin Harbour, 6
Crane, Steam Derrick, Messrs. G. Anderson and Co., 349
Crane, Steam Excavating, Messrs. Stothert and Pitt, 349
Crank Shaft, Patent, Messrs. Hall and Verity, 256
Critical Temperatures and Pressures of some Vapours, C. Vincent and J. Chappuis, 491
Crossing Refuges, 14
Crushing Manganese Dioxide? 89
Cummin's Cotton Baling Press, Messrs. Ormerod, Grierson, and Co., 64, 65
Cupola, Furnace, Mr. J. Riley on a New Form of, 194
Cuthbert's Combined Trap and Gulley, 400
Cut-off in the Large Cylinder of Compound Engines, Prof. R. H. Smith, 407
Cylinder Box-nailing Company, The, their Exhibits at the Inventions Exhibition 117
Cylinder Condensation in Steam Engines, Mr. C. L. Gately, 341, 362
Cylinder Condensation in Steam Engines, an Experimental Investigation, 341, 362, 383, 402, 424, 492
Cylindrical Nuts, 269
Czvelkovic, M. D., Automatic Floodgate, 131

DANIELL Cell, On a Form of Standard, 24
Danube Bridge Projects, The, 41-43, 69
Deane, Double-action Sinking Pump, The, 272
De Bange's 34-c.m. Breech-loading Gun, 123, 127, 151
Deeside Railway, The, 10
Dephosphorisation of Iron in the Puddling Furnace, 463
Depression in Trade, The, 419
Development of Inventions, 263
Devoll and Howl, Messrs., Brass Lathe, 314, 348
Diamond and Blue Stone Separator, 71
Diamond Boring Machine, Gulland's, 139
Dickson Boiler, The, 188, 213
Disintegration of Building Stone, 75
Dock, Dry, at Esquimault, 286
Docks for the East, 281
Dockyard Management, 457
Docwra and Son, Messrs., Diamond Boring Machine, Gulland's Patent, 139
"Dolphin," The United States Cruiser, 12, 31
"Dolphin," The *Mechanical Engineer* on the, 140
Donaldson, Mr. W., New Hydraulic Formulæ, 253
Donkey Pump, Mr. A. G. Mumford, 256
Douse, Mr. T. R., Arm and Table Pressing Machine, 354
Doutney, Mr. G., Attachment for Gas Cocks, 85
Drainage Undertaking, Important, 398
Draught in Chimney, Devices for Measuring, 128
Draught Gauge, A Simple Form of, 24
Drawing-office Management, 224
Dredger "Melbourne," The Barge-loading (*Supplement October 16th*), 300, 376, 379, 388, 392
Dredger, Single Chain Grab, 310
Drill, Messrs. Price and Belsham, 81
Drill Steer, Messrs. R. Garrett and Sons, 461
Drilling at the Nuttall Machine Works, Allegheny, 340
Drilling and Tapping Apparatus, Patterson's Portable, 34
Dynamo, Diagonal Engine and "Manchester," 110
Dynamo-electric Machine, The Elwell-Parker, 92
Dynamo-electric Machines, Messrs. Patterson and Coopers, 10, 47
Dynamo-Electric Machines and their Engines, Mr. G. Kapp on, 470
Dynamo, Improved Edison, 110
Dynamo, New Fifty-six Arc Light, 193
Dynamo, The Thomson-Houston, 157
Dynamometer, The Tatham, 502
Dynamos, Efficiency of, 89
Dynamos, Gülcher, 137

EARLE'S Shipbuilding and Engineering Company, Engines of the s.s. "Eastwood" (*Supplement, July 3rd*), 11
East Scottish Harbours, 22
Eastern Mail Contracts, 439
Eastern and Midlands Railway, The, 101
Eastern Mill, An, 8
Easton and Anderson, Messrs., Moncrieff Gun Carriages for Russian Ironclads, 246
"Eastwood," Triple Expansion Engines of the s.s. (*Supplement, July 3rd*), 11
Ebève Petroleum Gas Engine, 339
Echaig Bridge, 215, 220
Edison Incandescent Lamp, The, 226
Efficiency of Boilers, 259, 278
Efficiency of Fans, 109, 121, 150
Efficiency of Steam Engines, 13
Ehrenberg-Montauban Telemeter, The, 209
Ejector Condenser, Mr. Morton's, 272
Electric Incandescent Lamps, Value of, 454
Electric Launch, The Duke of Bedford's, 481
Electric Light Engines, First Avenue Hotel, 456, 462
Electric Lighting of Antwerp, 387
Electric Lighting in Detroit, 231
Electric Lighting by Induction, 430
Electric Lighting at the Inventions Exhibition, 273
Electric Lighting Plant, Important Sales of, 312
Electric Lighting in Somersetshire, 161
Electric Lighting in Stockholm, 121
Electric Resistance of Platenoid, 5
Electric Conductivity of Solid Mercury and Other Metals at Low Temperatures, 133
Electrical Engineering at the Inventions Exhibition, 9, 47, 61, 92, 110, 137, 156
Electrical Launch for the Italian Government, 464
Electricity, Oil and Gas, 147
Electrolysis, Commercial, 155
Electrolytic Reduction of Fine Copper from its Ores, 97
Electro-motive Force of Certain Tin Cells, 394
Electro-motive Force, On the Standard of, 150
Elevator, Mr. S. Butler's Patent, 494
Elswick Strike, The, 223
Elwell-Parker Dynamo-electric Machine, The, 92
Engine, Diagonal, and "Manchester" Dynamo, 110
Engine, Differential Gas, Mr. Atkinson, 99
Engine? Does the Buyer Build the, 345
Engine, Experiments made on a Condensing Compound, by a Committee of the Industrial Society, Mulhouse, 266, 278
Engine, Express, Emperor Ferdinand, Northern Railway, Austria (*Supplement, October 2nd*, 1885), 265
Engine Bed-plates and American Indicators, 67
Engine, Bennison's, 487
Engine, Clerk's Gas, 257
Engine, The Climax Vertical, The London and Colonial Engineering Company, 169
Engine, The Compound, Why it is Economical, 253
Engine, Compound "Invincible," First Avenue Hotel, 456, 462
Engine, Compound Surface Condensing Marine, 260, 261
Engine, Condensing, Mons. Bollinckx, 469, 476
Engine, 400-Horse Power Corliss, M. Van den Kerchove 350, 353, 356
Engine Fitted with Corliss Valve, Messrs. Robey and Co., 111
Engine, Gas, Mr. W. J. Munden, 361
Engine, Goods, Indian State Railways, 437, 442
Engine Governor Attachment, Mr. M. Volk, 292
Engine, Grasshopper, Eagle Foundry, Birmingham, 123
Engine, High-speed Traction, for India, Messrs. J. and H. McLaren, 495
Engine and Kapp Dynamo, Combined Allen, 85
Engine, Passenger, Great Southern and Western Railway of Ireland, *Supplement July 17th*, and pp. 48, 50
Engine, Passenger, Pennsylvania and Reading Railway, 396, 401
Engine, Pinchbeck's, 487
Engine, Portable, Messrs. J. T. Marshall and Co., 460
Engine, Robey's Semi-fixed, with Richardson's Electric Regulator, 51
Engine, The "Syrinx" Gas, 360, 361
Engine, Tank, Paris and St. Germain Railway, 410, 411
Engine, The Wootten, 481
Engineering Cases in Law Courts, 109, 150
Engineering in China, 151, 159
Engineering Education in New South Wales, 150
Engineering, Practical, at the Crystal Palace, 503
Engineering, Specialism in, 128
Engineering Trades, The, 74
Engineers for Cape Colony, 475
Engineers, An Opening for, 278
Engineers, School and College Training for, 183, 217
Engineers' Steel Castings, 225
Engines at the Antwerp Exhibition, 341, 356
Engines and Boilers of the French War-ship "Phlégéton," Antwerp Exhibition, 276, 277, 283, 293, 295
Engines, Compound, 87
Engines, Compound, La Société Cockerill, at the Antwerp Exhibition, 236, 242
Engines, Efficiency of Steam, 13
Engines, English and Foreign Steam, 259, 278
Engines of Express Passenger Steamer for the Seine, 122, 131
Engines, Express Passenger, for Steep Gradients, Belgian State Railways, 197, 204
Engines, Foreign *v.* English Steam, 202, 217
Engines, Gas, 57
Engines, Gas, at the Inventions Exhibition, 61, 99, 480
Engines, Inclined Shaft Rotary, 467
Engines, Rotary, 291, 299
Engines, Rotary, with Movable Partition, 487
Engines, Steam, at the Antwerp Exhibition, 211, 222
Engines, Steam, at the Royal Agricultural Show, 48
Engines, Straw-burning, 177, 179, 217, 259
Engines, Trial of a Pair of Horizontal Compound Tandem, 17, 35, 45, 507
Engines, Triple Expansion, 67, 339
Engines, Triple Expansion, with Joy Valve Gear, The Wallsend Slipway Company, 68, 73
Engines, Triple Expansion, of the s.s. "Eastwood" (*Supplement July 3rd*), 11
Engines, Twin Screw, of H.M. Torpedo Cruiser "Scott," 473
Engines, Vertical Flour-mill, 401
English *v.* American Rails, 440
English Guns, French View of, 294
English Ironworks in Russia, 251
English Manufactures in Germany, 505
English Visual Signalling and French "Telegraphic Optique," 398
Equations, Mr. C. V. Boys on a Machine for Solving, 470
Equations, Cubic, Mr. H. H. Cunyngham on a Machine for Solving, 470
Equilibrium Steam Trap, 401
Esquimalt, Vancouver Island, Dry Dock at, 286
Eureka Lock-nut, The, 337
Excavator, Wild's, 348
Excentric, Messrs. Bray and Heald, 360
Exhibition, The Antwerp, 35, 119 149, 151, 169, 176, 206, 211, 222, 236, 276, 277, 283, 295, 303, 309, 341, 349, 350, 353, 356, 410, 411, 431, 468, 469, 476
Exhibition, Budapest National, 196, 198
Exhibition, Colonial and Indian, 1886, 172
Exhibition at Glasgow, The Mining, 347
Exhibition, International, of Implements for Killing Parasites on Vines, 470
Exhibition, Another International, 302
Exhibition, The Inventions, 65, 87, 248
Atkinson's Differential Gas Engine, 99
Automatic Vacuum Brake, 298, 300
Awards at, 150
Band Saw Filing Machine, Messrs. Selig, Sonnenthal, and Co., 361
Boat-lowering Hook, Messrs. W. Reed and Co., 81
Brakes at the, 298, 300
Coal Borer, The "Acme," 311
Coal-loading Machinery, Mr. Jas. Rigg, 2
Coal Borer, The Universal, Messrs. Wainwright and Stayner, 311
Compound Engine, Messrs. Galloway and Sons, 436
Davey's Differential Valve Gear, 144
Deep Well Pump and Domestic Motor, Messrs. Hathorn, Davey, and Co., 81
Docwra and Son, Messrs., Diamond Boring Machines, 139
Drill, Messrs. Price and Belsham, 81
Dynamo, New Fifty-six Arc Light, 193
Dynamo-electric Machines, Messrs. Patterson and Cooper's, 10, 47
Ejector Condenser, Mr. Morton, 272
Electric Lighting at, 273
Electrical Engineering at, 9, 47, 61, 92, 110, 137, 156, 193
Elwell-Parker Dynamo-electric Machine, The, 92
Engine, Clerk's Gas, 257
Excavator, Wild's, 348
Friction Clutch, Messrs. Fisher and Walker, 82
Gas Engine, Atkinson's, The British Gas Engine Company, 480, 481
Gas Engine with Automatic Valve, Mr. W. J. Munden, 361
Gas Engines at, 61, 99, 257, 360, 480
Gulcher Dynamos, 137
Gulland's Patent Diamond Boring Machine, 139
Horology at, 118, 330
Hydraulic Flanging Machine, Messrs. Tweddell, Platt, Fielding, and Boyd, 236
Hydraulic Forging Press, Messrs. Tweddell, Platt, and Fielding, 284
Hydraulic Pumping Engines, Messrs. Fielding and Platt, 235
Jones' Dynamo-electric Machines, Messrs. Greenwood and Batley's, 61
Joy's Valve Gear and Crank for Triple Expansion Engine, 73
Jury Awards at, 129
Lift, Messrs. Stevens and Major, 271
Lines and Bridgman, Messrs., Box-nailing Machine, 117
Mather and Platt, Messrs., Diagonal Engine and "Manchester" Dynamo, 110
Mather and Platt, Messrs., Improved Edison, 110
Miscellaneous Machinery at, 2, 73, 80, 111, 117, 130, 234, 271, 310
Pump, The Deane Double-action Sinking, 272
Railway Brakes at the, 141
Robey and Co., Messrs., Engine Fitted with Corliss Valve, 111
Robey and Co.'s Engine, with Proel's Valve Gear, 106, 111
Single Chain Grab Dredger, Mr. H. J. Coles, 310
Steam Derrick Crane, Messrs. G. Anderson and Co., 349
Steam Excavating Crane, Messrs. Stothert and Pitt, 349
Swivel Bogie Locomotive, The Vulcan Foundry Company, 82, 84, 85
Syrinx Gas Engine, The, Messrs. Clark and Gillespie, 360
Thomson-Houston Dynamo, The, 157
Tide-gauge, Messrs. Légé and Co., 332
Victoria Dynamo, The, 193
Water Meter, Mr. Melling, 310
Water Meter, Uniform, Mr. G. Kent, 310
Water Motor, Mr. Sealey Allin, 311
Water Purifier and Softener, The Stanhope, 236
Westinghouse Brake Company, Stand of the, 141
Exhibition, a Scandinavian Electrical, 143
Exhibition, The Scottish International, 420
Exhibition, The Sheffield Industrial, 15
Expanding Boring Tool, Messrs. Horner and Adcock, 361
Expansion Coupling, Mr. F. E. Young, 448
Expansion Gear, Proel, 460
Explosive, A New, 173
Explosives, Annual Report on, 165
Export Rail Trade, The, 320
Eyre's New Patent Solid Forged Steel Wheels, 448

FAIJA'S Cement Mill and Testing Apparatus, 432
Fairlie, Mr. Robert Francis, 109
Fans, Testing, 87, 109
Farnham Waterworks, 46
Feldspar in the United States, Production of, 244
Fielding Engine, The, 467, 468

Fielding and Platt, Messrs., High-pressure Hydraulic Pumping Engines, 235
Fire-boxes of Straw Burning Engines, 177, 179
Fire-brick Arches and Spark Arresters, 479
Fire-proof Ceilings and Partition Walls, 441
Fisher Apparatus for Measuring Draught in Chimneys, 188
Fisher and Walker, Messrs., Friction Clutch. 82
Flanging Machine, Hydraulic, Messrs. Tweddell, Platt, Fielding, and Boyd, 236
Flight, Mr. Walter, 441
Floating Irrigating Plant, 473
Flood-gate, Automatic, M. D. Czvetkovic, 131
Flood Rock, Hell Gate, New York Harbour, Removal of, 273
Flour Mill Engines, Vertical, 401
Flour Mill, Phœnix, 452, 453, 461
Flue Tube, Mr. Paxman, 459
Folding Machines? 69
Forced Combustion, Howden's System of, 28
Forced Combustion at Sea, 180
Foreign Buyers of Vessels, 440
Foreign Competition, 167
Forging Press, Hydraulic, Mr. H. Berry, 337
Forging Press, Hydraulic, Messrs. Tweddell, Platt, and Fielding, 234
Forth Bridge, The, 69, 74, 195, 211, 238, 234, 235, 292, 296, 299
Forth Bridge, Mr. B. Baker on, 195. 241, 253
Foul Air in Paris and in London, 108
Fowler, Sir John, 190
Freezing by Cold Air in Tunnelling, 440
French Railway Servants, Privileges of, 180
French "Telegraphie Optique" and English Visual Signalling, 398
French View of English Guns, A, 294
Friction Clutch, Messrs. Fisher and Walker, 82
Friction and Lost Work, 475
Friction Still, Pearse's, 432
Fuel, The Power of, 90
Furnaces, Mr. J. Harrison, 216
Furness and Co., Messrs., Combined Rack and Rope Feed Saw Bench. 315
Furness and Co., Messrs., Tobacco Spinning Machine, 448
Future of the Auxiliary Fleet, The, 377

Gramme Arc Lamp, The, 380
Girder Trade, The, 478
Gas Engines, The Theory of, 441
Galloway Engines at the Inventions Exhibition, 436
Gas, Natural, 431
Goods and Railway Rates, 14
Guns, Combustion of Gunpowder in, 5
Gasoline from Petroleum? Plant for Manufacturing, 89
Gwynne v. Drysdale and Co., 87
Grooving and Polishing Chilled Rollers, Machines for, The Oerlikon Machine Company, 502
Gas Engines at the Inventions Exhibition, 480
German Competition, 500
Genetic Boiler, Messrs. T. Toward and Co., 495
Gibbons, Mr. H., Moulding Machine, 360
Great Eastern Steamship, sale of, 364
Gresham and Craven, Messrs., Self-acting Re-starting Injector, 372
Gas Engine Patents, 371
Gaseous Explosive Mixtures, On the Properties of, 363
Glasgow Mining Exhibition, 347
Grooving Millers' Hard Steel Rollers, 319
Guns, Ribond, 294
Greenwood and Batley, Messrs., Dynamos, 61
Gas, Use of Natural, 59
Graphic Kinematics of Machinery, 79
Gas Cocks, Attachment for, Mr. G. Doutney, 85
Gwynne v. Drysdale, 121
Gun, The De Bange, 123, 127, 151
Gulland's Patent Diamond Boring Machine, 139
Gülcher Dynamos, 137
Gantoch Rocks, Gas Beacon, 145
Gas Beacon, Gantoch Rocks, 145
Gun, The Largest Dynamite, 140
Gilbert, Dr. R. H., Death of, 146
Gas Production, 184
Gunnery Tables of Bashforth and Others, 203
Gold and Silver in the United States, Production of, 309
Gas Engines at the Inventions Exhibition, 257
Gaseous Explosive Mixtures, The Properties of, 274
Gun-cotton, Destruction of Guns by, 247
Gunnery Experiments, 206
Girders, Moving a Pair of Large, 204
German and Spanish Navies, The, 212
German Enterprise Abroad, 190
Gypsum in the United States, Production of, 46

Hall and Verity's Flexible Coupling, 352
Hall and Verity's Flexible Crank Shaft, 278, 317
Hall and Verity, Messrs., Patent Crank Shaft, 256
Hamilton, Mr. J., Horizontal Planer, 381
Hammer, Duplex Stamping, 121
Hammers, Steam. 57
Hammersmith Bridge, 184, 206
Hartley's Tubular Vertical Boiler, 372
Hathorn, Davey, and Co., Messrs., Deep-well Pumps, Domestic and Motor, 81
Hathorn, Davey, and Co., Messrs., Differential Valve Gear, 144
Hawksley, Mr., and his Remuneration, 282
Hedges' Speed Gauge, 67, 109, 121
Hedges' Switches and Cut-outs, 352
Hell Gate Rocks, New York Harbour, The Removal of, 273
Hellhoffite, A New Explosive Called, 173
Henley-on-Thames Sewerage Works, 140, 145
Henley-on-Thames Sewerage Works, Shone's Hydro-pneumatic Pumps for, 180
H.M.S. "Scout," 212
H.M. Torpedo Cruiser "Scout," Twin Screw Engines of, Messrs. J. and G. Thomson, 473
High-speed Motors, Mr. John Imray on, 470
Hooks, Boat-lowering, Messrs. W. Reed and Co., 81
Horner and Adcock, Messrs., Expanding Boring Tool, 361
Horology at the Inventions Exhibition, 118, 330
Horse-power of Turbines, 334, 351
Hot Blast? Invention of the, 240
Hours of Labour, The, 320
Howden Station, 72
Howden's System of Forced Combustion, Mr. D. Nicholson's Report on, 28
Howell, Mr. Price, Bicycle Wheel Rim, 310
Huddersfield Station Roof, Fall of the, 302, 320, 370, 391, 423, 451, 475
Hudson's Bay Trade Route, Referring to, 379
Hull, Barnsley, and West Riding Railway, Stations on the, 72
Hull and Barnsley Railway, The New, 129
Hydraulic Boiler Tests, 383
Hydraulic Forging Press, Berry's, 337
Hydraulic Formulæ, New, Mr. W. Donaldson, 253
Hydraulic Ram Construction, 351

Incandescent Lamps, Efficiency and Duration of some, 226
Incandescent Electric Lamps, Test of, 228
Incandescent Lamps, The Value of, 377
India and Colonial Exhibition, Forthcoming, 90
India Railway, Central, Smithy Roof, 273, 274
India, Sanitary Works in, 183
Indian Coast Surveys, 263
Indian State Railways, Bridges for, 238, 239
Indian State Railways, Iron Wagons, 86
Indian State Railways, Third-class Carriages, 413, 414
Indian Village at the Albert Palace, An, 303
Indicator, The Blythswood, 400
Indicater Diagrams, A Problem in, 508
Indicator, Experiments on the Steam Engine, 394
Indicator, Theory of the, and Errors in Indicator Diagrams, 394
"Indus," The Loss of the, 478
Injector, Self-acting Re-starting, 372
Injectors, Lifting, 503
Institute, Annapolis Naval:
Combustion of Gunpowder in Guns, Lieutenant J. F. Meigs, 5
Institute of Chemistry, The, 314
Institute, City and Guilds of London, for the Advancement of Technical Education, 368
Institute, the Franklin:
Report of the Commission on the Efficiency of some Incandescent Lamps, 226
Institute of Great Britain, The Sanitary, 231
Institute, the Iron and Steel:
Forth Bridge, Mr. B. Baker on the, 195
Iron Trade of Scotland. Mr. F. J. Rowan on, 185
New Form of Cupola Furnace, On a, Mr. J. Riley, 194
Notes on Shipbuilding, Mr. J. H. Biles, 195
Preliminary Programme of the Autumn Meeting at Glasgow, 124
Rise and Progress of the Scotch Steel Trade, Mr. J. Riley, 186
Value of Silicon Pig to the Ironfounder, On the, Mr. Chas. Wood, 194
Institute of Mining, Civil, and Mechanical Engineers, Chesterfield and Derbyshire, 22
Institution of Civil Engineers:
Dynamo-electric Machines and their Engines, Mr. G. Kapp, 470
Experiments on the Steam Engine Indicator, Mr. A. W. Brightmore, 394
High-speed Motors, Mr. John Imray, 470
Subjects for Papers, Session 1885-6, 237
Theory of the Indicator and the Errors in Indicator Diagrams, Professor O. Reynolds, 394
Institution of Engineers and Shipbuilders, North-East Coast, 324
Inaugural Address of the President, Mr. W. Boyd, 324
Institution of Engineers and Shipbuilders in Scotland:
Sinking the Cylinders of the Tay Bridge by Pontoons, Mr. Andrew S. Biggart, 25
Institution of Mechanical Engineers:
President's Inaugural Address, Mr. Jeremiah Head, 132
Design of Single Rivetted Lap Joints in Boilers, Professor R. H. Smith, 142
Institution of Mining Engineers, The South Staffordshire and East Worcestershire:
Testing of Fans, Professor R. H. Smith, 66
Inventions, Development of, 150, 317, 351
Inventions v. Law, Originality and Priority of, 451
"Ireland," The City of Dublin Steam Packet Company's New Mail Steamer, 158, 160, 162
"Ireland," The Mail Steamer, 158, 182, 200, 204
Iron and Coal Districts of Alabama, 1
Iron, Coal, and General Trades of Birmingham, Wolverhampton, and other Districts, 17, 37, 57, 75, 93, 113, 133, 151, 171, 189, 207, 229, 249. 267, 287, 305, 325, 343, 363, 383, 403, 425. 443, 463. 483, 505
Iron, A New Departure in the Metallurgy of, 216
Iron Gaspipes? Square Wrought, 31
Iron Production in the United States, 30
Iron, Reduction of the Charge for Boating, 149
Iron and Steel. Action of Tidal Streams on, 27
Iron Trade, Arbitration in the, 300
Iron Trade, A Practice in the, 203
Iron Trade of Scotland, 185
Iron Trade, Wages and Competition in the, 282
Ironclads, The Repair of, 237
Ironclads, Our Second-class, 21
Ironworks in Yorkshire, Abandonment of the Oldest, 247
Isherwood, Mr., on the Economy of the Compound Engine, 253
Isherwood, Mr, Account of Experiments made on a Condensing Compound Engine by a Committee of the Industrial Society of Mulhouse, 266, 278

Jacomb, Mr. C., on the Sewerage of Tottenham, 190
Japanese Government, Vessels for the, 325
Japanese Village, The, 505
Japanese Village, The New Hall for the, 479
Jarrow, New Steel Works at, 436
Johnson, Clapham, and Morris, Messrs., Corrugated Wire Lathing, 85
Joy's Valve Gear and Crank for Triple Expansion Engine, 73

Kapp Dynamo, Combined Allen Engine and, 85
Keen and Sonnenthal, Messrs., Double Hook Pipe Wrench, 353
Kelly's Revolving Gear, 494
Kerchove, M. Van Den, Corliss Engine, 350, 353, 356
Keys, Flat and Sunk, 180
Kinematics of Machinery, Graphic, 79

Lantern for Light Apparatus of the Second Order, Watling Island, Bahamas, 255, 256
Laryngoscope, An Improved, 481
Lathe, Brass, Messrs. Devoll and Howl, 314
Lathe, General Purpose, The Britannia Company, 494
Launch of the Palermo, 384
Launches and Trial Trips, 9, 48, 75, 94, 113, 133, 172, 190, 204, 229, 250, 288. 326. 344, 363, 463, 484, 506
Laws of Motion, 8, 24, 56, 66, 87, 120
Laying-up of Steamers, The, 264
Lead, Lessened Production of, 148
Lead Mining Industry, 399
Lead Pipe and Joints, Curious Specimen of, 216
Lead and Zinc in the United States, Production of, 346
Leaders:
Accidents in Coal Mines, 70
Admiral Porter and the American Navy, 329
Amalgamation of Lloyd's and the Liverpool Registries, 127
Amendment of the Patent Act, 166
American Locomotives for New South Wales, 399
Annual Report on Explosives, 165
Another International Exhibition, 302
Ballooning for Purposes of War, 70
Basic Steel, 166
Bearings of Large Marine Engines, 31
Belgian Girder Question, The, 330
Birmingham and its Pumping Engines, 108
Birmingham Ship Canal, 184
Block in the Suez Canal, 14
Boilers with Forced Circulation, 13
Brake Question on the Continent, The, 478
British Association and Bridge Engineering, 203
British Navy and Sir N. Barnaby, K.C.B., 107
Centrifugal Pump Patents, 54, 70
Ceylon Railways, 54
Chester as a Seaport, 378
City of London and Coal, The, 302
Cleanliness of London Termini, 90
Clerkenwell Fire, The, 301
Coal for Alexandria, 224
Coast Defences, Our, 358
Colliery Officials and the Government Inspectors, 108
Colombo Waterworks, The, 440
Colonial Patents, 89
Commission of Trade Depression, 54
Crossing Refuges, 14
Depression in Trade, The, 147, 419
Development of Inventions, The, 263
Diamond and Blue Stone Separator, 71
Distribution of Armour in Ships of War, 53
Docks for the East, 281
Dockyard Management, 457
Dolphin, The, 31
Drawing-office Management, 224
Eastern Mail Contracts, 439
Efficiency of Dynamos, 89
Efficiency of Steam Engines, 13
Electricity, Oil, and Gas, 147
Elswick Strike, The, 225
Emergency Brakes, 264
Engineers' Steel Castings, 225
English v. American Rails, 440
Leaders (continued):—
Export Rail Trade, The, 330
Fair Play in Retrenchment, 302
Fall of the Huddersfield Station Roof, The, 302, 320
Fifty Miles of Loaded Coal Wagons, 378
Foreign Buyers of Vessels, 440
Foreign Competition, 167
Foreign v. English Steam Engines, 202
Forth Bridge, The, 69
Forthcoming India and Colonial Exhibition, 90
Foul Air in Paris and in London, 108
Freezing by Cold Air in Tunnelling, 440
French "Telegraphie Optique" and English Visual Signalling, 398
Future of the Auxiliary Fleet, The, 377
Gas Production, 184
German Competition. 500
Girder Trade, The, 478
Goods and Railway Rates, 14
Gunnery Tables of Bashforth and Others, 203
Hammersmith Bridge, 184
Heavy Ship Forgings, 420
Hours of Labour, The, 320
Hull and Barnsley Railway, The New, 129
Important Drainage Undertaking, 398
"Improved Trade," Real or Unreal, 264
Indian Coast Surveys, 263
Indus, The Loss of the, 478
Inland Waters of Ceylon, The, 320
International Railway Congress at Brussels, 128
Iron Trade, A Practice in the, 203
Laying-up of Steamers, The, 264
Lead-mining Industry, The 399
Lessened Production of Lead, 148
Liverpool Waterworks, The, 378, 459
Lives of Steamers, The, 340
London and the Lea, 201
Loss of Vessels, 203
Lower Thames Valley Main Sewerage, 32
Madras Harbour Works, 32
Management of High-pressure Marine Boilers, 243
Management of Men, The, 499
Marine Boiler Furnaces, 165
Mercantile Navy, Our, 281
Metropolitan Board and the Fire Offices, 69
Midland Trades and the Railway Rates, 264
Mineral Royalties, 420
Miners' Wages, 244
Miners' Inspection, 225
Mr. Hawksley and his Remuneration, 282
Narrow Escape, A, 359
National Prejudices, 357
New Analysis of Water, 397
New 40in. Breech-loading Cartridges, 359
North British Railway, The, 282
Nuneaton Waterworks, 108
Ocean Mail Services, 264
Opening out of the Silkstone Coal-field in South-Yorkshire, 301
Otto v. Steel, 421
Patent Law Administration—A Knotty Point, 458
Patent-office Administration, 397
Paving in London Parks, 440
Phillips, Mr. J. O., and the Metropolitan Board, 477
Plumbing Trade, The, 282
Power of Fuel, The, 90
Preston Dock and Dribble Improvement, 54
Preston Show, The, 70
Priority of Invention, 440
Professional Etiquette, 479
Proposed Advance of Yorkshire Miners' Wages, 302
Proposed Railway Amalgamation, 421
Prospects of Revived Trade, 167
Prospects of Shipbuilding, 54
Pumping Engine in Staffordshire, 282
Pumping the Staffordshire Mines, 459
Purification of the Thames, The, 319
Putney Bridge, 282
Railway Communication, 184
Railway Rates, 358
Railway Rates for Coal, 71
Registry Amalgamation, 108
Repairs of Submarine Cables, 420
Richmond Water Supply, 14
Rolling Stock in Lancashire, 128
Royal Agricultural Society, The, 499
Royal Commission on Merchant Shipping, 127
Royal Engineers, The, 458
Russia and Eastern Trade, 264
St. Petersburg a Seaport, 264
Salt in South Durham, 500
San Francisco Fire Brigade, The, 128
Sanitary Works in India, 183
School and College Training for Engineers, 183
Science Teaching and Begging, 224
Sewage Disposal, 302
Sham Sheffield Cutlery, 32
"Sheffield," 225
Ship Canal and the Railway Companies, 258
Ship Canals at Home and Abroad, 378
Shipping Legislation, 378
Shipping and the Royal Commission, 32
Siemens Memorial, The, 439
Sir Lyon Playfair's Address, 201
Small Mercies, 148
Specialism in Engineering, 128
Standard of Light, The, 243
Steamship Insurance, 167, 398
Steel Boilers, 457
Steel Consumption in Staffordshire, 244
Steel Sleeper Question, 340
Steel Sleepers, 399, 421
Steel Testing, 477
Street Renewals, 90
Subsidence on the Metropolitan Railway, 478
Successful Men, 244
Tenders, Lowest, 357
Terminal Charges and the Traders, 14
The Old Folly over again (Miners' Wages', 302
Threatened General Stoppage of Collieries, 282
Threatened Great Strike of Miners, 358
Torpedo Boat Catchers and Destroyers, 419
Torpedo Boats, 53
Tower Bridge, The, 108, 340
Trade, The Turn of, 203
Tramway Development in London, 501
Transmission of Power to Short Distances, 319
Trevithick Memorial Fund, The, 358
Triple Expansion Engines, 339
Unsanitary Burial Places and Methods, 90
Vacant Spaces in London, 500
Value of Incandescent Lamps, The, 377
Village Water Supply, 478
Wages and Competition in the Iron Trade, 282
Wages in the Iron Trade, 478
Wages of Shipbuilders, 358
Zinc in Marine Boilers, 281
Legal Intelligence:
Jensen and Trier v. Smith, 374
John Gwynne v. Drysdale and Co., 112
Otto v. Linford, 412, 450
Otto v. Steel, 421, 462, 482, 496
Leicester Water Supply, 332
Lenoir Engine Practically Considered, The, 334
Lethéby-Bunsen Photometer, The, 227
Letters to the Editor:—
Aid to Engineering Solution, Your Reviewer, 423
Air Vessels, Henry Johnson, 180
Albert Bridge, The, Charles Mossop, 454
Anomaly in Boiler Explosions, An, Inspector, 121
Antwerp Exhibition, The, A. Haacke and Co., 151
Antwerp Exhibition, The, T. Van den Kerchove, 391
Antwerp Exhibition Awards, The, C. W. Julius Blancke and Co., 183
Antwerp Exhibition Awards, The, Sam. J. McMechan, 206
Asphalte for Bridge Floors? Pontifex, 69
Atmospheric Condensers? N. H., 201
Barnes' Boiler Feeder? J. S. C., 107
Behaviour of Steam in the Cylinder, D. K. Clark, 297
Bell Buoys, J. W., 296
Berthon Boats, E. S. Berthon, 67
Block Signalling, Hugh Browne, 217
Letters to the Editor (continued):—
Block System, C. J. L., 57, 180
Block Signalling, Thos Hicken, 217
Block Signalling, Christopher J. Little, 240
Block Signalling, R. B. P., 240
Boiler Efficiency, T. Williams, 278
Bottomley's Radial Axle, C. Brown, 24
Bournemouth Undercliff Competition, Fairplay,
Brake Returns, Henry Prince, 259
Brass Liners on Propeller Shafts? Putting, Amigos, 107
Brick Kilns? Brick Burner, 419
Capsule and Tinfoil Machinery? Laminoir, 147
Carron's Lubricators or Grease-boxes? S. and S.,
Casting Pulleys? Founder, 457
Church's Slide Valves, W. C. Church, 475
Clark on Sewerage? W. P. C., 339
Coal Compressing Machinery? Coal Dust, 419
Coal Grinding Machine, W. D. G., 201
Coal Supply to London, W. Taylor, 475
Coke Crushing and Flange Joints? H. C., 243
Compound Engines, Simpson and Denison's, 87
Compound Locomotives, D. M. E., 297
Compound Locomotives, Duplex, 297
Concrete Mixers? J. M., 147
Continuous Brake Returns, Clement E. Stre 240, 278
Copying Presses, W. A., 31
Cork Cutting Machinery, J. W. H., 13
Crane Brakes? Crane, 183
Crushing Manganese Dioxide? C. H. S, 89
Curved Bressumers? Builder, 101
Danube Bridge Projects? The, R. H. Graham, 69
Decoundon's Hydrometer? A. D., 397
Depression of Trade, Hyde Clarke, 159
Depression of Trade, The, Export Trader, 180
De Bange Gun, The, Chas. S. Berthon, 151
Development of Inventions, F. F. Ommaney, 317
Development of Inventions, W. S., 206, 351
Development of Inventions, R. H. N., 159
Development of Patents, The, J. E. A., 203
Dr. Lodge's Mechanics, Φ. Π., 334, 374, 442, 47
Dr. Lodge's Mechanics, Wm. Donaldson, 351, 442, 505
Dr. Lodge's Mechanics, Oliver Lodge, 334
Dr. Lodge's Mechanics, Wm. Muir, 391
Driving an Adit, G. Anderson and Co., 296
Driving an Adit, W. B. B., M. Inst. C.E., 334
Duplex Stamping Hammer, Ed. B. Meatyard, 121
Eastern Mill, An, Jno H. Turner, 8
Ebève Petroleum Gas Engine? J. H. H., 339
Efficiency of Boilers, W. Macdonald, 259
Efficiency of Fans, R. H. Graham, 121
Efficiency of Fans, R. H. Smith, 109, 150
Efficiency of Fans, W. C. Unwin, 121, 159
Efficiency of Turbines, Wm. Donaldson, 374, 443
Efficiency of Turbines, A. Miller, 351
Efficiency of Turbines, Robt. H. Smith, 351, 391
Electrical Engineering, Learning, T. S., A.M.I.C.E., 357
Engine Bed-plates and American Indicators, Audi Alteram Partem, 67
Engineering Cases in the Law Courts, M. Powis Bale, 109
Engineering Cases in Law Courts, Wm. Spence, 150
Engineering in China, J. W. C. Haldane, 151
Engineering in China, Wm. Marriott, 159
Engineers for Cape Colony, Turbine, 475
English and Foreign Steam Engines, An Engineer, 217
English and Foreign Steam Engines, H. J. W., 217
English and Foreign Steam Engines, J. D. K., 259
English and Foreign Steam Engines, Governor, 259
English and Foreign Steam Engines, David Halley, 278
English and Foreign Steam Engines, Nemo, 217
English and Foreign Steam Engines, Observer, 217, 259
Fire-clay Moulds? H. B., 357
Flat and Sunk Keys, Fred. Evans, 180
Foulding Machines? R. B., 69
Forced Combustion at Sea, Jas. Howden, 180
Friction and Lost Work, Beauchamp Tower, 475
Future Naval Battles and How to Fight them, Geo Elliot Admiral, 8
Gas Engines, Jas. Atkinson, 57
Grooving Millers' Hard Steel Rollers, A. D. E., 319
Gwynne v. Drysdale and Co., Geo. Macaulay Cruikshank, 87
Gwynne v. Drysdale, John Gwynne, 121
Hall and Verity's Flexible Crank Shaft, J. F. Hall, 317
Hall and Verity's Flexible Crank Shaft, R. E. Proudlock, 278
Hall and Verity's Flexible Crank Shaft, Rotifer, 278
Hammersmith Bridge, John Dixon, 206
Hankwill Tin-plate? J. T., 439
Hedge's Speed Gauge, Killingworth Hedges, 109
Hedge's Speed Gauge, J. Shiffner, 67, 121
Holyhead Mail Service, The, Passenger, 217
Horse-power of Turbines, The, W. Donaldson, 334
Huddersfield Station Roof, R. E. Ellis, 475
Huddersfield Station Roof, T. Graham Gribble, 391, 451
Huddersfield Station Roof, W. I. S. McCleary, 423
Hydraulic Ram Construction, W. Robertson, 351
Income Tax Assessments, Vulcan, 475
Invention of the Block System, T. H., 121
Invention of the Hot Blast, An Old Carbonade, 240
Jam-making? J. H. K., 223
Japanese Village, The, George Weldon, 505
Large Output of Bessemer Steel, W. H. Greenwood, 351
Laws of Motion, B. A., 8
Laws of Motion, W. A. Benson, 24, 120
Laws of Motion, Φ. Π., 8, 56, 66, 151
Laws of Motion, A Girton Girl, 8
Laws of Motion, I. Lancaster, 120
Laws of Motion, Oliver Lodge, 56, 87
Laws of Motion, Wm. Muir, 24, 66
Laws of Motion, A Student, 8, 66
Lead Pencil Machinery? M. H. C., 223
Lenoir Engine, Practically Considered, The, Air, 334
Lifting Injectors, S. R. Hawke, 503
Locomotive of the Future, Benjamin Bagshaw, 374
Locomotives for New South Wales, Britisher, 442
London Drainage, J. Orwell Phillips, 454
London Water Supply, Francis Bolton and Percy G. Frankland, 451
Macgregor on Gas Engines, Veritas, 121
Machine for Cutting Out Old Boiler Rivets? P. B., 165
Men of Practical Science and Men of Pure Science, H. C., 504
Mica Packing? J. R., 201
Milk Condensing Machinery? W. W., 281
Mining Exhibition, Glasgow, The, W. C. Teale, 443
Modes of Motion and of Education, W. A. S. Benson, 159
Novel Method of Erecting Bridgework, Hubert Bland, 121
Opening for Engineers, An, Wm. Hay, 278
Originality and Priority of Inventions v. Law, Isylo, 451
Oxide of Iron? S. S., 69
Patent Law Administration, J. A. Mays, 317
Patent Law Administration, E. R. Wethered, 317
Patent-office, Patent Agent, 24
Patent-office Administration, Fred. Brown, 334
Patent-office Administration, Geo. Downing, 351
Patent-office Administration, Expert, 334
Patent-office Administration, An Inventor, 351
Patent-office Administration, E. R. Wethered, 351
Patent-office Administration, W. Lloyd Wise, 475
Patent-office Delays, Fel. Inst. Patent Agents, 9
Patent-office Grievance, Another, Nemo, 9
Patent-office Management, A Purchaser and a Sympathiser with Deaf Mutes, 217
Patent-office Report, Wm. Spence, 67
Patent-office Specifications, Nemo, 67
Peculiarities of Steel, A. B., 475
Peculiarities of Steel, Arthur Cooper, 475
Peculiarities of Steel, Wm. Galbraith, 474
Peculiarities of Steel, C. Percy Gilchrist, 475

LETTERS TO THE EDITOR (*continued*):—
Peculiarities of Steel, John Harrington, 504
Peculiarities of Steel, F. B. Du Pré, 504
Peculiarities of Steel, Low Moor, 475
Peculiarities of Steel, E. Windsor Richards, 475
Peculiarities of Steel, Sam. R. Smyth, 474
Peculiarities of Steel, Snap, 474
Peculiarities of Steel, Thos. Turner, 474
Peculiarities of Steel, J. R. Wicksteed, 504
Peculiarities of Steel, W. T. W., 475
Piston Valves, John Thom, 296
Plant for Manufacturing Gasoline from Petroleum? M. L. H., 89
Power Required to Drive Lathes? Turner, 439
Problem of Flight, The, H. C. Wynne Edwards, 503
Problem of Flight, The, I. Lancaster, 87, 374, 403
Railway Couplings, Alf. Davis, 151
Railway Couplings, Clement E. Stretton, 351
Railway Speed, M. M., 109
Rivetted Boiler Joints, Robt. H. Smith, 180
Rivetted Joints, Inquirer, 159
Rock Drills? N. B., 203
Rolled Girders, J. J. Fletcher, 443
Roller Milling, Henry Simon, 443
Roundthwaite's Boiler, J. Roundthwaite, 259
Royal Engineers, The, A Non-commissioned Officer, 475
Royal Engineers, The, Non-professional, 504
Royal Engineers, The, An Old Engineer, 505
Sagging of Wire Ropes? The, Ropes, 499
Schmidt's Decorticating Machine? C. A. C., 243
Scotch Iron? J. C., 477
Shone's Hydro-pneumatic Sewerage Pumps for the Henley Sewerage Works, Galway, Bainbridge, and Co., 180
Signal Semaphores and the Earl's Court Accident, G. Edwards, 278
Solid Beams, The Author of the Review, 57
Solid Beams, Wm. Donaldson, 24, 67
Spence's Metal? P., 439
Square Wrought Iron Gas Pipes? J. C. A., 31
Steam Engine Economy, W. J. H., 334
Steam Hammers, G. Stevenson, 57
Steel Gun Factories in the United States, W. H. Jacques, 180
Steel Plates in the North of England, Steel, 443
Straw Burning Engines, Ransomes, Sims, and Jefferies, 217
Straw Burning Portable Engines, Roumelia, 259
Strength of Bridges, The, J. A. A. Waddell, 217
Supply of Locomotives to Italy, H. G. H. Spiller, 391
Syrinx Gas Engine, The, Ernest T. Collins, 391
Tapioca Machinery and Plant? H. J. W., 31
Technical Education and its Professors, G., 391
Technical Education and its Professors, H. Kemreth Austin, 443
Testing Fans, R. H. Graham, 87
Testing Fans, R. H. Smith, 87, 109
Timber Preservation by Sulphate of Copper? A. P. and Co., 281
Tool Making for Australia, G. James, 159
Tower Bridge, The, American, 121
Trades' Unions and Piece-work, A. C., 504
Trades' Unions and Piece-work, Fitter, 503
Trades' Unions and Piece-work, Young Fitter, 391, 451
Trades' Unions and Piece-work, A London Master, 374, 442
Training of Engineers, Locomotive, 217
Treatment of Marine Boilers at Sea, Alfred Rutter, 504
Triple Expansion Engines, Andrew Jamieson, 67
Turbines? Ipse Dixit, 397
Vacuum Brakes, J. W. Dear, 504
Value of Incandescent Lamps, Woodhouse and Rawson, 454
Vale Gears, T. Swan, 180
Vincent's Rivet Machines? J. P. M., 127
Water Meters, G. Kent, 351
Water Meters, J. A. Muller, 334, 454
Westminster Abbey Organ, W. Eads, 217
Wire Rope Railway? Traveller, 201
Wire Rope Suspension Bridges? Inquirer, 165
Wood Bearings, B. D. and Co., 165
Wrought Iron Factory Chimneys? A Builder, 223
Wrought Iron Tube Making Machinery? A. A., 301
Zinc in Marine Boilers, John A. Rowe, 451
Zinc in Marine Boilers, David Phillips, 423
Lift, Messrs. Stevens and Major, 271
Lighting Power of Electricity and Gas, The Penetrative, 177
Lines and Bridgman, Messrs., Box Nailing Machine, 117
Link Belt, Messrs. Jas. Lee and Sons, 12
LITERATURE:
Aid to Engineering Solution, by Louis D'A. Jackson, 359
Autobiography of a Whitehead Torpedo, by Guns, 264
Chain Cables and Chains, Thos. W. Traill, 225
Die Steuerungen der Dampfmaschinen, Emil Blaha, 167
Draught, by William Philipson, 340
Egyptian Obeliska, by H. H. Gorringe, 441
Electrolysis: a Practical Treatise on Nickeling, Coppering, Gilding, Silvering, &c., by Hippolyte Fontaine, 441
Elementary Mechanics, Including Hydrostatics and Pneumatics, by Oliver Lodge, 320
Engineer's, Millwright's, and Machinist's Practical Assistant, W. Templeton, 71
England's Supremacy, by J. S. Jeans, 500
Exterior Ballistica, Captain James M. Ingalls, 71
Gas Engines, W. Macgregor, 32
Gas and Water Companies' Directory, 1885, p. 264
Guide to Sanitary House Inspection, by W. P. Gerhard, 479
Handbuch der Elektrotechnik, Dr. Erasmus Kittler, 108
History and Description of the Manchester Waterworks, by J. F. La Trobe Bateman, 283
Minutes of Proceedings of the Institution of Civil Engineers, with other Selected and Abstracted Papers, vol. lxxix. to lxxxiii., 378
New Formulas for the Loads and Deflections of Solid Beams and Girders, by William Donaldson, 14
Panama Canal: its History, its Political Aspects and Financial Difficulties, by J. C. Rodriques, 379
Prospector's Hand Book, by J. W. Anderson, 479
Strains in Ironwork: a Course of Eight Elementary Lectures, by Henry Adams, 479
The Royal Mail, its Curiosities and Romance, James Wilson Hyde, 148
Tables and Diagrams for Curving Tramway Rails and for Making and Laying Railway Crossings, by W. T. Olive, 340
Tables and Diagrams of Switches and Crossings, by Thomas Summerson, 340
Tables for Setting Out Curves from 101ft. to 5000ft. Radius, by H. A. Cutler and F. J. Edge, 321
Torpedo Scare, The, by Hobart Pacha, 90
Treatise on Friction and Lost Work in Machinery and Mill Work, Robert H. Thurston, 302
Treatise on Practical Astronomy as Applied to Geodesy and Navigation, by C. L. Doolittle, 340
Twenty Years with the Indicator, Thomas Pray, jun., 226
Little Weighton Station, 72
Liverpool, Joint Engineering and the Vyrnwy Waterworks for, 104
Liverpool New Waterworks on the River Vyrnwy, 294
Liverpool Waterworks, 378
Lloyd's and the Liverpool Registries, Amalgamation of, 127
Liquid Fuel in the Navy, 481
Liverpool Water Supply, The, 479
Liverpool Waterworks, The, 459
Lock-nut, The Eureka, 337
Locomotive Boilers, 170
Locomotive, Compound, Webb's Patent, for the Companhia Paulista (*Supplement Oct. 30th*), 280, 283, 341
Locomotive Engines at the Antwerp Exhibition, 410, 411
Locomotive of the Future, 374
Locomotive for New Zealand, American, 422
Locomotive, Swivel Bogie, The Vulcan Foundry Company, 82, 84, 85, 112
Locomotives on the Belgian State Railways, 197, 204
Locomotives, Compound, 271, 297, 303, 317, 329, 390
Locomotives in Italy, Supply of, 391
Locomotives for New South Wales, 442
Lodge, Dr., his Mechanics, 334, 351, 374, 391, 442, 475, 505
London and Colonial Engineering Company, Compound Surface Condensing Marine Engine, 260, 261
London Drainage, 454
London and the Lea, 201
London Sewage, Disposal of, on Canvey Island, 421
London, Vacant Spaces in, 500
London Water Supply, 104, 451
Lower Thames Valley Main Sewerage, 32
Lower Thames Valley Main Sewerage, by Henry Robinson, 21

MACGREGOR on Gas Engines, 121
Machine, A Wonderful, 475
Madras Harbour Works, 32
Magneto-electric Phenomenon, On a, 493
Management of Men, The, 499
Manchester Ship Canal, The, 10, 109
Manchester Ship Canal Company, The, 278
Manchester Ship Canal and the Railway Companies, The, 358
March, Mr. W., Street Sweeper and Wagon Combined, 94
Marine Boiler Furnaces, 165
Marine Boilers, Management of High-pressure, 243
Marine Boilers at Sea, Treatment of, 504
Marls in the United States, Production of, 446
Marshall, Mr. C. A., Testing Micrometer, 261
Mason Science College, The, 173
Mather and Platt, Messrs., Diagonal Engine and "Manchester" Dynamo, 110
Maximum Work, Principle of, 169
Mechanical Engineer to the London *Engineer*, The New York, 140
Meigs, Lieut. J., On the Combustion of Gunpowder in Guns, 5
"Melbourne," The Barge-loading Dredger (*Supplement October 16th*, 1885), 300, 336, 337, 388, 392
"Melbourne," Compound Engines of the Dredger, Messrs. W. Simons and Co., 376, 379
Mercantile Navy, Our, 282
Merchant Steamers as Admiralty Cruisers, 186
Merchant Venturers' School, Bristol, 93
Mersey Tunnel, The, its Geological Aspects and Results, T. Mellard Reade, 124
Metallic Paving, Wilkes', 496
Metallurgy and Fuels, Lectures on, at King's College, 258
Meter, "Uniform," Mr. G. Kent, 310
Meter, Water, Mr. Melling, 310
Methven Slit and Burner, The, 226
Metropolitan Board and the Fire Offices, 69
Metropolitan Sewage Disposal, Purification of the Thames, 286
Microbes, Removing, from Water, 214
Micrometer, Testing, Mr. C. A. Marshall, 261
Midland Railway, St. Pancras Extension, 488, 489
Midland Railway Extension, Details of Ironwork, 488, 498
Midland Traders and the Railway Rates, 264
Mill Engine, 50-Horse Power Vertical Compound, 30, 35
Milling Machine, Special, 400
Milling and Slotting Machine, 433
Mills, Mr. W., Instantaneous Boat-engaging and Disengaging Gear, 491
Mineral Oil, Carrying of, in Steamers, on the Black Sea, 445
Mineral Royalties, 420
Minerals for Manufacturing Purposes, Rare, 408
Miners, Threatened Strike of, 358
Miners' Wages, Fair Play in Retrenchment, 302
Miners' Wages, The Old Folly over Again, 302
Miners' Wages, Proposed Advance of Yorkshire, 302
Mines Inspection, 225
Mining Exhibition, Glasgow, 443
Miscellanea, 16, 29, 52, 63, 83, 105, 125, 146, 163, 181, 199, 221, 245, 262, 275, 304, 313, 335, 355, 375, 395, 417, 438, 455, 471, 501
Miscellaneous Machinery at the Inventions Exhibition, 234
Molecular Radiation in Incandescent Lamps, 24
Moncrieff Gun Carriages for Russian Ironclads, 246
Motion and of Education, Modes of, 159
Motor, Water, Mr. Sealey Allin, 311
Moulding Machine, Mr. H. Gibbons, 360
Moving a Pair of Large Girders, 204
Muirhead, Mr. John, 263
Mumford, Mr. A. G., Donkey Pump, 256
Munden, Mr. W. J., Gas Engine with Automatic Valve, 361

NATIONAL Prejudices, 357
Naval Battles, Future and How to Fight them, 8
Naval Engineer Appointments, 87, 112, 131, 150, 169, 187, 259, 283, 320, 329, 364, 367, 401, 432, 454, 479, 493
New Companies, 172, 191, 209, 231, 251, 269, 289, 307, 327, 345, 365, 385, 405, 427, 445, 465, 485, 507
New South Wales, New Coal Mine in, 334
New South Wales, Railway Bridges in, 367
New South Wales, Silver Ores and Metallurgy, 338
New South Wales, Wages of Mechanics in, 332
Newspaper Statistics, 114
Nitro-gelatine, 101
North British Railway, The, 282
North of England, 18, 38, 58, 76, 96, 114, 134, 152, 172, 189, 208, 230, 249, 268, 288, 306, 326, 344, 364, 384, 404, 425, 444, 464, 484, 506
Norwegian Navy, Progress of the, 145
Norwegian State Railways, 159
Notes from Scotland, 18, 38, 58, 76, 96, 114, 134, 152, 172, 190, 208, 230, 250, 268, 288, 306, 326, 344, 364, 384, 404, 426, 444, 464, 484, 506
Notes from Lancashire, 18, 37, 57, 75, 95, 113, 133, 152, 171, 189, 207, 229, 249, 267, 287, 306, 325, 343, 363, 383, 403, 426, 443, 463, 483, 505
Notes and Memoranda, 16, 29, 52, 63, 83, 105, 125, 146, 163, 181, 199, 221, 245, 262, 275, 304, 313, 335, 355, 375, 395, 417, 438, 455, 471, 501
Notices to Correspondents, 13, 31, 53, 69, 89, 107, 127, 147, 165, 243, 263, 281, 301, 319, 339, 357, 377, 397, 419, 439, 457, 477, 499
Nottingham Waterworks Covered Service Reservoir, Mr. Ogle Tarbotton, 27
Nuneaton Waterworks, 108

OBITUARY:—
Box, Mr. Thomas, 124
Carpenter, Dr. W. B., 379
Clark, Mr. John, 321
Fairlie, Mr. Robt., 109
Gilbert, Dr. R. H., 146
Muirhead, Mr. John, 268
Swanwick, Mr. Fred., 390
Tresca, M. Henri, 15
Weldon, Mr. Walter W., 237
Yolland, Col., 206
Ocean Mail Services, 264
Ocean Meteorology—Rainfall at Sea, 310
Oil Mill Export, Messrs. Rose, Downs, and Thompson, 145
Oil to Quiet the Waves, Use of, 28
Ordnance by Gun-cotton, Destruction of, at Alexandria, 247
Ordnance for Turkey, 87
Organ, Wedlake's, 369, 373
Organ in Westminster Abbey, the New (*Supplement, August 21st*), 138, 155, 164, 168, 217
O'Keefe and Robson, Messrs, Self-acting Tramway Point, 292
Otto *v.* Linford, 412, 450
Otto *v.* Steel, 421, 462, 496
Otway, Mr. G., Barrow-loading Brick cutting Table 491
Oxide of Iron? 69
Ozokerit, Apparatus for Purifying, 187

Pacific Mills, Massachusetts, An Enormous Manufacturing Concern, 124
Palermo, The Water Supply of, 151
Panama Canal, The, 94
Patent Act, Amendment of the, 166
Patent Law Administration, A Knotty Point, 458
Patent-office, 24, 39
Patent-office Administration, 317, 334, 351, 397,
Patent-office Delays, 9
Patent-office Grievance, Another, 9
Patent-office Management, 217
Patent-office Report, 67
Patent-office Specifications, 67
Patents in Belgium and Austro-Hungary, 161
Patents, Development of, 206
Patterson, Mr., Drilling and Tapping Apparatus, 491
Paving in London Parks, 440
Pearce's Friction Steel, 464
Pearse's Friction Still, 432
Penetration of Wrought Iron Plates, On the Laws of, 74
Penetrative Lighting Power of Electricity and Gas, 177
Permanent Way, Howard's Light, 56
Persian Railway, A Proposed, 220
Phillips, Mr. J. O., and the Metropolitan Board, 477
"Phlégéton," Engines and Boilers of the French War Ship, Antwerp Exhibition, 276, 277, 283, 293, 295
"Phlégéton," Pumping Machinery of the, 318
Phœnix Flour Mills, Newcastle-on-Tyne, 452, 453, 461
Phosphates in the United States, Production of, 229
Pig Iron Trade in the United States, 209
Pipe Wrench, Double Hook, Messrs. Keen and Sonnenthal, 353
Piston, Adjustable, Messrs. J. Gillott and Sons, 481
Piston Valves, 296
Plan of the Antwerp Exhibition, 119
Planer, Horizontal, Mr. J. Hamilton, 381
Plate-flattening Machine, Seven Roller, Messrs. Rushworth and Co., 341
Platinoid, The Electric Resistance of, 5
Plough, Arc Axle, Messrs. J. and F. Howard, 460, 461
Plough, Early Four-furrow Balance Steam, 55
Plumbing Trade, The, 282
Pneumatic System, Development of, as Applied to Telegraph Purposes, 399
Poyser's Railway Chair, 388
Precious Stones in the United States, 114
Pressure in a Closed Vessel with Ordinary Powder, 188
Preston Dock and Ribble Improvement, 54
Preston, Royal Agricultural Society's Show—*see Royal Agricultural Society*.
Preston Show, The, 70
Price and Belsham, Messrs., Drill, 81
Price-Williams, Mr. R., Presentation to, 352
"Prince Albert de Belgique," Table of Observations on the Working of the Engine and Boilers of the s.s., 237
Priority of Invention, 440
Private Bill Legislation, 33, 71, 82, 479
Problem of Flight, 87, 374, 391, 403, 442, 503
Proel's Valve Gear, Messrs. Robey and Co.'s Engine with, 106, 111
Professional Etiquette, 479
Propeller and Crank Shafts, 10
Propeller Shaft, Arrowsmith's, 51
Properties of Gaseous Explosive Mixtures, The, 254
Protractor, Mr. W. F. Stanley, 85
Pulveriser, Griffin's, 64
Pump, The Deane Double-action, Sinking, 272
Pump, Hydraulic, Broxbourn Colliery, Mr. J. Moore, 265
Pump Patents, Centrifugal, 54, 70
Pumping Engines at Hannibal, Mo., 493
Pumping Engines, High-Pressure Hydraulic, Messrs. Fielding and Platt, 235
Pumping Engines in Staffordshire, 282
Pumping the Staffordshire Mines, 459
Pumps, Deep Well and Domestic Motor, 81
Pumps, Large Thick Slurry, Mr. A. H. Beasley, 472
Putney Bridge, 282

QUETTA Railway, The, 285, 314

RADIAL Drilling and Boring Machine, Mr. W. Asquith, 381
Radiant Heat, Prof. B. Stewart on, 266
Rail Fastenings, Mr. F. W. Stevens, 472
Railway Amalgamation, Proposed, 421
Railway Axles in Germany, 312
Railway Brakes, Mr. E. C. Fairholme, 493
Railway Brakes at the Inventions Exhibition, 141
Railway Bridges in New South Wales, 367
Railway, The Canadian Pacific, 359
Railway Chair, Poyser's, 388
Railway Communication, 184
Railway Congress at Brussels, International, 128
Railway Couplings, 80, 351
Railway, The Deeside, 10
Railway, The Eastern and Midlands, 101
Railway Extension in South Australia, 431
Railway Journey through a Burning Forest, 135
Railway Matters, 16, 29, 52, 63, 83, 105, 125, 146, 163, 181, 199, 221, 245, 262, 275, 304, 313, 335, 355, 375, 395, 417, 438, 455, 471, 501.
Railway, A Proposed Persian, 220
Railway, The Quetta, 285
Railway Rates for Coal, 71
Railway Reminiscence of the United States, 190
Railway at Southsea, Opening of a New, 5
Railway Speed, 109
Railway Works of the United Kingdom, The, 307
Railway and Cheap Land in Australia, 286
Railways, Norwegian, 159
Rainfall and Dessication in South Africa, 44
Rainfall of July, The, 121
Rapier's Pendulum, Titan, 383
Rating of Machinery, The, 161
Reade, Mr. T. Mellard, On The Mersey Tunnel, 124
Reed and Co., Messrs. W., Boat-lowering Hook, 81
Refrigerating Machine, Mr. J. Chambers, 130
Registry Amalgamation, 108
Repairs of Submarine Cables, 420
Retarded Ebullition and Superheated Water, 135
Revolving Screw in Chimney, Forced Draught by, Mr. J. C. Kafer, On, 9
Ribble and Preston Docks, The, 470
Richardson's Electric Regulator, 51
Richmond Water Supply, 14
Riley, Mr. J., at the Meeting of the Iron and Steel Institute, 186, 194
Rivetting Machine, Tweddell's 150-Ton, 82, 88, 103, 111
Rivetted Boiler Joints, 180
Rivetted Joints, 159
Robey and Co., Messrs., Engine with Proel's Valve Gear, 106, 111
Robinson, Mr. H., On the Lower Thames Valley Main Sewerage, 21
Rolling Stock in Lancashire, 128
Ronkar's Theorem, 77, 78
Rolled Girders, 443
Roller Milling, 443
Roller System of Flour Milling, 461
Root Boiler, The, 188, 205
Rose, Downs, and Thompson, Messrs., Export Oil Mill, 145
Roundthwaite's Boiler, 259
Roundthwaite, Mr., Boilers, 216
Rowan, Mr. F. J., on the Iron Trade of Scotland, 185
Royal Agricultural Society, The, 499
ROYAL AGRICULTURAL SOCIETY, PRESTON:
Chimney Lifter, Messrs. Marshall and Co., 49
Early Four-furrow Balance Steam Plough, 55
Howard's Light Permanent Way, 56
Map of Machinery Department, 38
ROYAL AGRICULTURAL SOCIETY, PRESTON (*continued*)—
Miscellaneous Machinery at, 55
Silos on Howard's System, 55
Steam Engines at, 48
Royal Commission on Merchant Shipping, 127
Royal Commission on Trade, The, 251
Royal Engineers, The, 458, 475, 504, 505
ROYAL SOCIETY, THE:
Action of Tidal Streams on Metals during Diffusion of Salt and Water, by Thos. Andrews, communicated by Professor Stokes, 27
Electric Resistance of Platinoid, Mr. J. T. Bottomley, 5
Rushworth and Co., Messrs., Angle and Tee-bending Machine, 103
Rushworth and Co., Messrs., Seven Roller Plate Flattening, 341
Russia and English Trade, 264
Russia, English Ironworks in, 251
Russian Navy, Addition to the, 352
Rust Cement, 59

SADOINE, Baron, 379
Safety Gauge Construction, A, 150
St. Helens, Main Drainage of, 294
St. Petersburg and Seaport, 264
Salford Ironworks Science School, The Results of Examinations at, 129
Salt in South Durham, 500
Salters' Company and Technical Education, 135
Salvage Engineering, 490
San Francisco Fire Brigade, 128
Sand Dunes, 191
Schmidt's Decorticating Machine, 243
Schwackhofer's Calorimeter, 34
Science and Art Department of the Committee of Council on Education, South Kensington, 143
Science, Men of Practical, and Men of Pure Science, 504
Science Teaching and Begging, 224
Scientific Research, 317
Scotland, Iron Trade of, 185
Scotland, Steel Trade of, 186
Scottish Harbours, E., 22
Screw Propeller, Waddington's Accessory to the, 401
Selected American Patents, 20, 40, 60, 98, 116, 136, 154, 174, 192, 210, 232, 252, 270, 290, 308, 328, 346, 366, 386, 406, 426, 446, 466, 486, 508
Severn Tunnel, Opening of, 198
Sewage Disposal, 302
Sewage Pumping Machinery, Messrs. Hayward Tyler and Co., 473
Sewage Pumps, Hydro-pneumatic, Henley-on-Thames 140
Shafting and its Bearings, 291
Shaker Gear, Messrs. J. T. Marshall and Co., 460
Sham Sheffield Cutlery, 32
Shaw, Professor H. S. Hele, Appointment at Liverpool, 56
"Sheffield," 225
Sheffield District, The, 38, 58, 76, 95, 114, 134, 152, 171, 190, 208, 230, 249, 268, 287, 306, 326, 344, 364, 384, 404, 426, 444, 464, 483, 506
Sheffield Industrial Exhibition, 15
Ship Canal and the Railway Companies, The, 358
Ship Canals at Home and Abroad, 378
Ship Forgings, Heavy, 420
Shipbuilders, Wages of, 358
Shipbuilding, Mr. J. H. Biles' Notes on, 194
Shipbuilding on the Clyde, 500
Shipbuilding, Decline in, 250
Shipbuilding in Italy, 380
Shipbuilding, Prospects of, 54
Shipbuilding in the Royal Dockyards, 187
Shipping Legislation, 378
Shipping and the Royal Commission, 32
Shone's Hydro-pneumatic Sewerage Pumps, 180
Shone's Sewage Pumps, Henley-on-Thames, 140
Siberia, The Forests of, 327
Siemens Memorial, The, 439
Siemens, Sir William, Biography of, 472
Signal Semaphores and the Earle's Court Accident, 278
Silicon, The Influence of, on the Properties of Cast Iron, by Thomas Turner, 505
Silicon Pig, Mr. C. Wood on the Value of, to the Ironfounder, 194
Silkstone Coalfield in South Yorkshire, Opening Out of the, 301
Silos on Howard's System, 55
Silver Mines of Bolivia, 97
Silver Ores and Metallurgy in New South Wales, 333
Silver Smelting in New South Wales, 34
Simpson, Messrs., Waterwork Engines, 300
Simpson and Shipton, Messrs., Rotary Engine, 309
Sir Lyon Playfair's Address, 201
Slurry Pumps, Large Thick, Mr. A. H. Beasley, 472
Smith, Professor R. H., on the Design of Single Rivetted Lap Joints in Boilers, 142
Smith, Professor R. H., The Horse-power of Turbines, 175, 233, 330
SMITHFIELD CLUB SHOW, 459
Arc Axle Plough, Messrs. J. and F. Howard, 460, 461
Drill Steer, Messrs. R. Garrett and Sons, 461
Expansion Gear, Proel, 460
Flue Tube, Mr. Paxman, 459
Portable Engine, Messrs. J. T. Marshall and Co., 460
Shaker Gear, Messrs. J. T. Marshall and Co., 460
Spark Arrester, Messrs. R Garrett and Sons, 459
Smithy Roof, Central Indian Railway, 273, 274
Société Cockerill, La, Compound Engines at the Antwerp Exhibition, 236, 242
Société Cockerill of Seraing, La, their Engines at the Antwerp Exhibition, 211, 222
SOCIETY OF ARCHITECTS:
Address of the President, Mr. H. R. Gough, 353
Society of Arts, 400
Society, Bath and West of England, 113
SOCIETY, THE CHEMICAL:
Critical Temperatures and Pressures of Some Vapours, by C. Vincent and J. Chappuis, 491
Influence of Silicon on the Properties of Cast Iron, by Mr. Thos. Turner, 505
Society, Civil and Mechanical Engineers', 485
SOCIETY OF ENGINEERS, 5, 208, 467
Dephosphorisation of Iron in the Puddling Furnace, Mr. Philip S. Justice, 463
SOCIETY, KING'S COLLEGE ENGINEERING, 316
Bell Founding, Mr. Archer, 338
Railway Brakes, Mr. F. C. Fairholme, 493
Standards of Light, Mr. C. H. Wordingham, 374
Well Sinking, Mr. A. Collins on, 406
SOCIETY, LIVERPOOL ENGINEERING, 368, 470
Application of Compressed Air to Warehouse Requirements, Mr. Peter Evans, 327
Recent Researches on the Nature of Friction and the Action of Lubricants, Prof. Hele-Shaw, 368
SOCIETY OF MECHANICAL ENGINEERS, THE AMERICAN:
Steam Boilers as Magazines of Explosive Energy, Mr. Robt. H. Thurston, 4
Table of Sizes of Chimneys, Mr. Wm. Kent, 159
Society for Mining Students, The British, 172
SOCIETY, THE PHYSICAL:
Calibration of Galvanometers by a Constant Current, Mr. F. Mather, 470
Lecture Experiments on Colour Mixtures, Capt. Abney, 24
Electro-motive Force of Certain Tin Cells, Mr. E. J. Herroun, 394
Machine for the Solution of Cubic Equations, Mr. H. H. Cunyngham, 470
Machine for the Solution of Equations, Mr. C. V. Boys, 470
Magneto-electric Phenomenon, On a, Mr. G. H. Wyatt, 493
On a Form of Standard Daniel Cell and its Application for Measuring Large Currents, Dr. J. A. Fleming, 24
On the Phenomenon of Molecular Radiation of Incandescent Lamps, Dr. J. A. Fleming, 24
On Problems in Networks of Conductors, Dr. J. A. Fleming, 24
On Some Further Experiments with Sulphur Cells, Mr. Shelford Bidwell, 24

SOCIETY, THE PHYSICAL (*continued*):—
Thermo-dynamical Relations, On Some, Prof. Wm. Ramsay and Dr. Sydney Young, 493
Thermo-electric Position of Carbon, Mr. J. Buchanan, 24
Solid Beams, 24, 57, 67
Southampton New Waterworks, 343
South-Eastern Railway Works, Ashford, 51
South Indian Railway, Iron Roofs, 316
South Yorkshire Colliery Strikes, Losses from, 94
South Kensington Museum, 33, 59, 91, 134, 153, 257, 316, 363, 371, 400, 435, 483
Spark Arrester, Messrs. R. Garrett and Sons, 459
Spark Arresters, Fire-brick Arches and, 470
Sparke, Mr., Revolving Stuffing-box, 491
Speed Gauge, Hedge's, 67, 109
Standard of Light, The, 243
Stanhope Water Purifier and Softener, The, 236
Stanley, Mr. W. F., New Protractor, 85
Stanley-Thompson Incandescent Lamps, The, 227
Steam in the Cylinder, Behaviour of, 296
Steam Engine Economy, 334
Steam Hammers, 57
Steam Tramway Engine Manufactures, 214
Steam Trap, Equilibrium, 461
Steamers, The Lives of, 340
Steamship Insurance, 167, 393
Steel Boilers, 457
Steel Boilers, Mr. A. J. Maginnis on a Strange Failure of, 447, 449
Steel, Breaking with Dynamite, 82
Steel Consumption in Staffordshire, 244
Steel Gun Factories for the United States, 180
Steel, The Peculiarities of, 474, 475, 504
Steel Plates in the North of England, 443
Steel Problem, The, 488
Steel Sleeper Question, The, 340
Steel Sleepers Again, 399, 421
Steel Steam Cruising Vessels, Plans for, for the United States Navy, 51
Steel, Testing, 477
Steel Trade of Scotland, 186
Steel Works at Jarrow, New, 436
Steel Wheels, Solid Forged, Eyre's New Patent, 448
Steering Gear, Traction Engine, Messrs. Aveling and Porter, 506
Stettin Harbour, 40-ton Floating Crane at, 6
Stewart, Professor Balfour, on Radiant Heat, 265
"Stiletto," The Steam Yacht, 15
Stockholm, Electrical Lighting in, 124
Stockholm, The Telephone in, 129
Stratford-on-Avon, Association of Municipal and Sanitary Engineers and Surveyors at, 394
Stratford-on-Avon Waterworks, 414, 415, 416, 438
Straw-burning Engines, 177, 179, 217
Straw-burning Portable Engines, 259
Street Renewals, 90
Stress and Strain Diagrams, Autographic, 158
Strike of Miners, Threatened, 358
Strikes, Losses from South Yorkshire Colliery, 94
Stuffing-box, Revolving, Mr. Sparke, 491
Subsidence on the Metropolitan Railway, 478
Subway in the New London Street, 361
Successful Men, 244
Suez Canal, Block in the, 14
Sugar, Extracting, from the Cane, A New Process, 145
Sugar Factory, A Great, 44
Sukkur Bridge, The, 234
Sulphur Cells, Experiments with, 24
SUPPLEMENTS:
Barge-loading Dredger "Melbourne," for the Melbourne Harbour Commissioners, October 16th, 1885
Compound Locomotive, Webb's Patent, for the Companhia Paulista, Mr. W. J. Hammond, Engineer, Messrs. Sharp, Stewart, and Co., Builders, October 30th, 1885
Express Engine, Emperor Ferdinand's Northern Railway, Austria, October 2nd, 1885
Four-coupled Passenger Engine, Great Southern and Western Railway of Ireland, Mr. J. A. Aspinall, July 17th, 1885
New Organ, Westminster Abbey, Messrs. W. Hill and Son, August 21st, 1885
Triple Expansion Engines of the s.s. "Eastwood," July 3rd, 1885
Water Tube Boilers at the Antwerp Exhibition, Messrs. de Naeyer and Co., December 4th, 1885
Surface Condensation, 333
Sutton and Willoughby Railway and Harbour and the Grimsby Fishing Trade, 161
Swanwick, Mr. Fred., 399
Sweeping and Elevating Machine, Mr. W. March, 94
Switches and Cut-outs, Hedge's, 352
Sydney, University Evening Schools in, 65
Syrinx Gas Engine, The, 360, 361, 391

TANK Engine, Paris and St. Germain Railway, 410, 411
Tapioca Machinery and Plant? 31
Tatham Dynamometer, The, 502
Tay Bridge, Sinking the Cylinders of, by Pontoons, 25, 26
Tay, New Viaduct over the, 248
Tea Trains, American, 307
Technical Education and Foreign Competition in the Engineering Trades, 305
Technical Education and its Professors, 391, 443
Telegraphy by Sight Signalling or "Télegraphie Optique," 389, 409
Telemeter, The Ehrenberg-Montauban, 209
Telephone in Stockholm, The, 129
Telpher Line, Glynde, The, 321
TENDERS:
Ashfield Waterworks, 25, 62
Brewing Plant at the Lion Brewery, Messrs. Scamell and Colyer, 340
Criccieth—Extension of Main Sewers, Mr. Thomas Roberts, 25
Henley-on-Thames Sewerage, 145
Hinckley Local Board—Well Sinking, 208
Leicester Sewage Works, Mr. J. Gordon, 25
Luton Sewage Scheme—Abstract of Tenders for Rising Mains, &c., 354
Oxford Local Board, Engine House and Pump Well, &c., for, W. H. White, 104
Southall Railway Station Bridge, Mr. Thos. Newell, 300
Southampton Corporation, Mr. William Matthews, 279
Sutton-in-Ashfield, Notts., Waterworks, Mr. George Hodson and Mr. Herbert Walker, 25, 62
Tottenham Local Board of Health—Extension of Sewage Works, 120
Wednesbury Urban Sanitary Authority, Sewerage Works, Mr. E. Pritchard, 354
Weston-super-Mare Sea Front Improvements, Mr. T. J. Scooner and Mr. A. Barratt, 354
Tenders, Lowest, 357
Terminal Charges and the Traders, 14
Testing Fans, 87, 109
Testing of Fans, Professor R. H. Smith, 66
Thames, Purification of the, 319
Thermo-dynamical Relations, On Some, 493
Thomson-Houston Dynamo, The, 157
Thurston, Mr. Robert H., on Steam Boilers as Magazines of Explosive Energy, 4
Thwaite and Neville, Messrs., Hoisting and Traversing, 314
Tidal Streams, Action of, on Iron and Steel, 27
Tide Gauge, Messrs. Légé and Co., 332
Tilbury Docks, 51
Timber in the Straits Settlements, 44
Timber, On the Strength of Round, Mr. W. H. Preece, 338
Titan, Rapier's Pendulum, 383
Tobacco Spinning Machine, Messrs. W. Furness and Co., 448
Tool Making for Australia, 159
Torpedo Boat Catchers and Destroyers, 419
Torpedo Boat, A Large, 472
Torpedo Boats, 75, 153
Tottenham Local Board of Health, Extension of Sewage Works, 120
Tower Bridge, The, 53, 108, 121, 340
Tower of London, The, 445
Towers, Engine, The, 467, 468
Trade, Commission on, 198, 231
Trade, Depression of, 147, 159, 180
Trade Guilds in Germany, 44
Trade, Improved, Real or Unreal, 264
Trade, Prospects of Revived, 167
Trade, The Royal Commission on, 251
Trade, The Turn of, 203
Trades Unions and Piecework, 374, 451, 504
Tramway, The Bessbrook and Newby Electrical, 216
Tramway, Development in London, 301
Tramway Engine Manufactures, Steam, 214
Tramway Engines, 140
Tramway Point, Self-acting, Messrs. O'Keefe and Robson, 292
Transmission of Power to Short Distances, 319
Trap and Guiley, Cuthbert's Combined, 400
Trawlers, Steam, for Brazil, 383
Tresca, M. Henri, 15
Trevithick Memorial Fund, The, 358
Triple Expansion Engines, 339
Tube Beader, Mr. C. Wicksteed, 265
Tunnel, The Mersey, Mr. T. M. Reade on the, 124
Turbines, Efficiency of, 175, 233, 334, 351, 374, 391, 443
Turbines, The Horse-power of, Prof. R. H. Smith, 330
Tweddell, Mr. R. H., 150-ton Rivetting Machine, 82, 88, 103, 111
Tweddell, Platt, Fielding, and Boyd, Messrs. Hydraulic Flanging Machine, 236
Tweddell, Platt, and Fielding, Messrs., Hydraulic Forging Press, 234

UNDERGROUND Temperatures, 354
United States Naval Cruisers, Plans for New, 121
United States Navy, The, 479
University College, Bristol, 208, 217
University College, London, 206, 283
University College, London, Awards, 332
Unwin, Prof. W. C., Autographic Stress and Strain Diagrams, 158

VALUE of Incandescent Lamps, 454
Valve Gear, Mr. Beveridge, 35
Valve Gear, Differential, Davey's, 144
Valve Gear of M. Van den Kerchove's Corliss Engine, 350
Velocity in Belt and Rope Gearing, On, 367
Ventilation of Buildings, Quantity of Air Required in the, R. F. Hartford, 371
Vessels, Loss of, 203
Viaduct Over the Tay, New, 248
Victoria Dynamo, The, 193
Village Water Supply, 478
Vines, Killing Parasites on, Exhibition of Implements for, 470
Volk, Mr. Magnus, Engine Governor Attachment, 292
Vulcan Foundry Company, Locomotive by the, 82, 84, 85, 112
Vyrnwy Water Scheme, Progress of the, 256

WADDINGTON'S Accessory to the Screw Propeller, 401
Wages in the Iron Trade, 478
Wages and Competition in the Iron Trade, 282
Wages of Mechanics in New South Wales, 332
Wagons, Iron, Cawnpore-Achnera Railway, 86
Wales and Adjoining Counties, 18, 38, 58, 76, 93, 114, 134, 152, 172, 190, 208, 230, 250, 268, 288, 306, 326, 344, 364, 384, 404, 426, 444, 464, 484, 506
Walther-Meunier, M., Retarded Ebullition and Superheated Water, 135
Water from the Chalk Formations, 343
Water-meters, 334, 351, 454
Water Purifier and Softener, The Stanhope, 236
Water Supply for New York, 180
Water Supply of Palermo, 151
Water-tube Boiler, The Development of a, 322, 323
Water-tube Boilers at the Antwerp Exhibition (*Supplement, December 4th*), p. 431
Wave Motions, 45
Waves, Use of Oil to Quiet the, 28
Webb Apparatus for Measuring Draught in Chimneys, 188
Webb, Professor J. Burkiss, Draught Gauge, 24
Webb's Patent Compound Locomotive, 280, 283
Wedlake's Organ, 369, 373
Weldon, Mr. Walter W., 237
Well Sinking, Mr. A. Collins, on, 408
Wem Waterworks, Mr. T. S. Stooke, 218, 219, 220
Westinghouse Brake Company, The Stand of the, at the Inventions Exhibition 141
Westinghouse Brakes in Belgium—A Narrow Escape, 359
Weston Incandescent Lamp, The, 227
Weston's Over-driven Centrifugals, 347
Whitworth Scholarships, 131
Wicksteed, Mr. C., Tube Beader, 265
Wild's Excavator, 348
Wilke's Metallic Paving, 496
Window-glass Making in the United States, 129
Wire Lathing, Corrugated, 85
Witham, The River, 71, 391
Wood Bearings, 165
Woodhouse-Rawson Incandescent Lamp, The, 227
Wootten Engine, The, 481

YACHT, A Fast, 15
Yolland, Death of Colonel, 206
Yorkshire Coal Trade with Hull during the Past Half-year, 67

ZINC in Marine Boilers, 281, 423, 451

LONDON: PRINTED FOR THE PROPRIETORS BY GEORGE LEOPOLD RICHE, AT THE OFFICE OF GEORGE REVEIRS, GRAYSTOKE PLACE, FETTER LANE, E.C., AND PUBLISHED BY HIM AT THE "ENGINEER" OFFICE, 163, STRAND, IN THE PARISH OF ST. MARY-LE-STRAND, IN THE COUNTY OF MIDDLESEX.—FRIDAY, FEBRUARY 5, 1886.